



SATURDAY, MAY 24, 1873.

Hudson's Improvement in Locomotives.

We give herewith a cut of a proposed improvement in locomotives recently patented by Mr. W. S. Hudson, of the Rogers Locomotive Works, Paterson, N. J. The improvement, it will be seen, consists in applying to a locomotive a principle somewhat similar to the compound engines which have of late found so much favor in marine practice.

Figure 1 is a cross-section through the smoke-box, and figure 2 is a longitudinal section of the smoke-box and front end of the boiler. The steam from the boiler passes through the steam pipe *C* into the smaller cylinder *D*, in the ordinary manner. The exhaust from the cylinder *D* passes through the exhaust pipe *A* into the superheater *H*, which is a broad, flat vessel suspended in the smoke-box and having tubes, *h*, passing through it. There are also in this superheater several partitions, *h*, which compel the steam to circulate thoroughly, in order that it may be well dried and absorb as much heat as possible. From the superheater the steam passes through the pipe *I* into the larger cylinder *D'*, and after being used in that cylinder it passes through the exhaust pipe into the smoke-box in the ordinary manner. There is also a secondary steam-pipe, *E*, by which, when desired, steam may be admitted directly from the boiler into the steam-chest of the cylinder *D*. The passage of steam through this pipe is controlled by a valve, *e*, which can be opened or closed by the engineer from the foot-board. The valves of both cylinders can be worked in the ordinary manner by a link-motion, or otherwise.

The points covered by the patent are the superheater, *H*, the general arrangement of the two cylinders, pipes and superheater, and the general claim for a locomotive with the means of working the two cylinders in combination and provided also with the secondary steam-pipe *E*.

Needham's Reciprocating Signal Light.

The reciprocating speed signal light represented in the accompanying engraving is designed to assist in securing the prompt and safe movement of railroad trains running at night either singly or in sections. The inventor's circular describes its construction as follows:

"The wheel *A* is suspended in the frame *B* in such a manner that it may remain in contact with the axle of the car and revolve with it. A short crank is attached to the shaft of the wheel *A*, which, by means of the connecting rod *C*, moves the rock shaft *D*. The horizontal arms of this rock shaft are joined to the upright rods *E*, which carry the red glass set in the frames *F* up and down before the lamps at intervals varying with the speed of the train. These rods are so arranged that one causes the signal to show forward and the other back. When running by day, the wheel should be raised entirely from the axle by means of the lever *I* to avoid unnecessary wear. All joints are so made that they will run without oil, but to insure durability they should be oiled two or three times a week. In case the rear part of the train becomes detached, the signal light will enable the men on the forward part to determine whether the rear part is stopped or under control. At a speed of fifteen miles per hour, the white light gives 30 flashes per minute. In following this light, an engine with five-foot driving wheels may make three revolutions to one flash of the white light with safety."

The following further description of the objects and working of the apparatus is furnished us by the inventor, Mr. W. L. Needham, of No. 81 Hicks street, W. S., Cleveland, Ohio.

"A very simple and durable device, moved by contact with the axle of the rear car, or caboose, causes lights visible in either direction to change from red to white. At a speed of fifteen miles per hour, the white light flashes out thirty times per minute; at ten miles per hour, twenty times per minute; and while the car is at rest the lights remain stationary, thus showing at once whether the car is moving fast or slow, or is stopped."

"When one train is following another, the question of paramount importance is, whether the leading train is stopped or in motion. It is well known among men accustomed to handling trains that red lights are frequently deceptive in regard to distance, and the ordinary lights carried at the rear of trains convey no idea of motion, except that the space between them appears to increase as they are approached, and to diminish as they recede."

"Considerable time is necessary to make this change apparent, and many disastrous collisions have occurred from the fact that the stopping or slackening of a leading train could not be immediately perceived by a train following. By means of this speed signal light, the engineer or persons in charge can tell at a glance whether the train ahead is moving fast or slow, or standing still, and judge promptly of what action is necessary; and also, in case the rear part of the train becomes detached, the speed signal enables the men on the forward part to determine whether the rear part is stopped or under control. As a white light is visible at a greater distance than a colored one,

especially in a foggy or a murky atmosphere, the flashing out of the white signal gives warning to an approaching train at a greater distance than a red light can be seen."

"This light is now in use on twenty-five cars on the Cleveland, Columbus, Cincinnati & Indianapolis Railway, and others on the Cleveland & Pittsburgh Railroad, and it is pronounced by railroad officers, conductors and engineers who have become acquainted with it the best rear light that has been brought into practical use."

"The first car equipped with it has been in constant use two years, and, except some slight experimental changes, has run with a little expense as the ordinary lights, and is still in complete order."

Telegraphing Under Difficulties.

The lecture recently delivered by Captain John N. Hills before the Literary Association of Ravenwood, Ill., gave the following as one of his own experiences in telegraphy:

On March 2, 1868, a train on the Bennington & Rutland Railroad was snow-bound about three-fourths of a mile from Shaftsbury. The weather was intensely cold; there were no provisions on the train; fuel was nearly exhausted; night was approaching, and the situation began to look desperate. Mr.

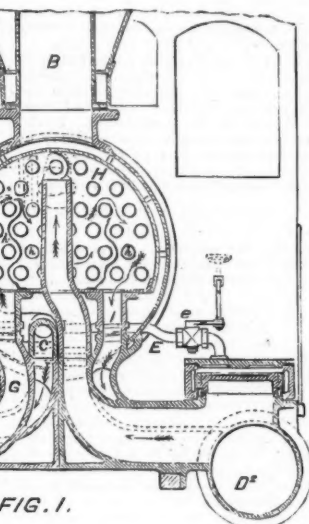


FIG. 1.

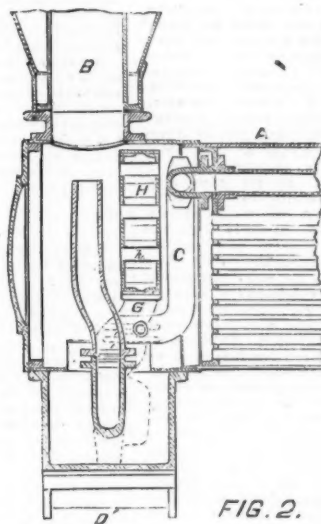


FIG. 2.

HUDSON'S IMPROVEMENT IN LOCOMOTIVES.

Hills' two small children were with him, and one of them, too young to be fed with arguments, clamored for something better."

The Superintendent of the road, Mr. F. C. White, was on the train, but, strange to say, the snow wouldn't clear the tracks for a railroad king. In his helplessness he was entirely at a loss for any means of relief, until Captain Hills, without instrument of any kind, except the wire on the poles, proposed, nevertheless, to telegraph to Rutland by merely striking the ends of the wire together—thus making and breaking the telegraphic circuit, as he would have done with the key of an ordinary operating instrument. An engine was immediately sent to the relief of the blockaded train. But the entire operation required the receiving as well as the sending of messages."

This was the critical test of Captain Hills' ingenuity, skill and nerve, and, until this was accomplished, the Superintendent and passengers felt no assurance that the message sent had been intelligibly communicated to the officers at Rutland. Striking his wires together, he wrote to the operator at Rutland as follows: "Trouble. Answer slowly. I am working without an instrument. I will receive your an-

reductions and drawbacks, free passes, etc., to an ever increasing number, so that he who has occasion to ride much may ride free; in short, everybody shall have a little better rate or a few more privileges than everybody else."

Then, of course, every railroad company should be required unflinchingly to meet promptly the interest on its bonds and pay regular dividends on its capital stock; and, finally, the failure of any company to keep and perform all the obligations and requirements of the statutes should work a forfeiture of its charter; or, in other words, it must be chopped off or stretched out at the discretion of an impartial (!) jury of twelve men, to be made up exclusively of farmers and members of farmers' granges."

It would be strange indeed if there were not grievances lying at the bottom of this movement so threatening to railroads that ought to be remedied, and railroad companies will act most wisely if they set to work themselves to provide, on a reasonable basis, for an adjustment of real causes of complaint."

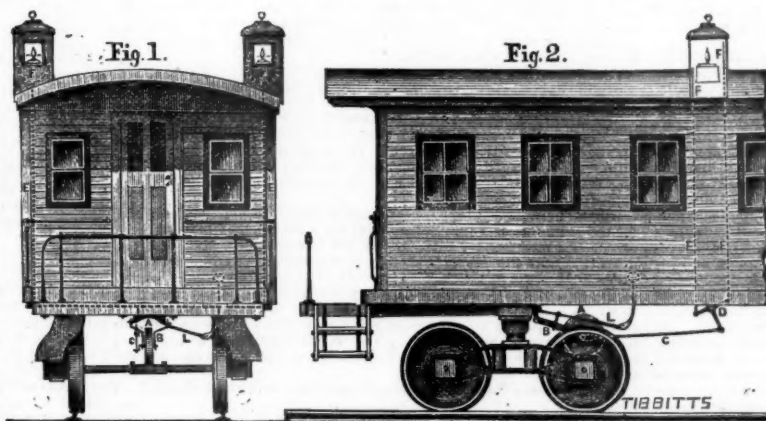
But the measures taken by the public generally are such as would cut their own throats if actually carried out. Besides, while these thunderbolts are forged to be hurled at the great trunk-line monopolies, they in fact do such roads little harm while they do cripple or kill outright all new enterprises, as well as the smaller roads—north-and-south lines, for instance—which tend to equalize tariffs better and more effectually than any law can."

Furthermore, there are usually two sides to questions, and it would be quite an exception if there were not two sides to these complaints against the action of railroads. And, while there is no doubt but that railroad companies give, and often enough, just grounds for public complaint, are the public altogether blameless in their dealings with railroads? Is it not notorious that a large part of the public act upon the theory that corporations are to be dealt with according to different principles from those acknowledged among individuals, if, indeed, they are not considered legitimate subjects of plunder? Such a state of things is to be deplored, for it is unnatural and injurious to all interests."

But the remedy is not in hasty legislation—that is the outgrowth of temper. There is a reasonable basis to which both sides must come in the end, though one extreme and the other may be madly tried. Meantime the more solid investigations of commissions composed of able men, like that of Massachusetts, are movements in the right direction, although it may be taken as extremely doubtful if the result of such investigations, aided by accumulated experience, will lead to the conclusion reached by the distinguished gentlemen of the Massachusetts Commission.

W.

The mills of A. McDonald & Co., at St. Louis, turn out from 40 to 60 car axles per day, besides locomotive crank pins and other forgings. About 60 men are employed.



NEEDHAM'S RECIPROCATING SIGNAL LIGHT.

swer through my tongue." He touched the frosty wire to his tongue, with the same result, at first, as that enjoyed by the boy who undertook to lick the frost from his skate steel, but found that the steel knew more about licking than he did. The wire would not let go until it was warmed and then kindly took the skin off with it. So the wire was lengthened and carried into the car. After it was warmed Captain H. received the message by putting one end of the wire above and the other under his tongue, and letting the electric current pass through it, when he was able to read by the succession of sharp and somewhat painful electrical shocks."

His success was perfect—and he not only sent and received messages for the Superintendent but for several of the passengers. The only evil consequence of the exploit was the total loss of taste which Captain H. suffered for several days afterward."

The Wilmington Co-operative Association, of Wilmington, Del., has secured five acres of land at Oxford, Pa., and has begun to put up the necessary buildings. The association expects to have the shops ready for occupation by July.

Railway Association of America.

We give below the President's address, and the report of the committees received at the session of the 14th and 15th of May, in full:

PRESIDENT'S ADDRESS.

The following is the address of the President, Hon. Thomas Allen, to the members assembled in convention at the St. Nicholas Hotel, New York, May 14, 1873:

GENTLEMEN: We meet for the first time since the "Western & Southern Railway Association" became nominally the "Railway Association of America." We do not meet in a spirit of mere self-assertion, nor in a spirit of antagonism to any other system of transit, nor because we think it necessary to combine against any threatened encroachments upon our rights, or to raise any deprecatory ejaculations against the spirit of hostility, or threatened social or political ostracism which have marked the more extreme actions of those who are agitating the country professedly in the interest of cheap transportation. The railroad system is the offspring of the necessity for cheap, rapid and certain transit. Though as yet imperfect, it is the best system yet devised for a country so vast, so varied and so needful of development as America. To it the country is very largely indebted for its wonderful material progress. It raises the valleys; it reduces the hills; it runs along the plains; it penetrates the mountains; it threads the cities as though they were pearls upon a string; it carries the light and life of commerce into the wilderness and subdues it for civilization; it diffuses comfort; equalizes prices and privileges; increases and distributes wealth, and makes common neighbors of the wide-spread population of a continent. Its introduction vastly cheapened and facilitated transit, and transportation increased the value of lands far off from the market, and greatly stimulated their settlement and cultivation. Crude at first, every year of its life has improved its character and its usefulness; every year it improves in its machinery, and while adding certainty and celerity to its movement, is ever reducing the cost of transportation. It is, perhaps, to be regretted that the railroads have not learned, and perhaps have not cared to learn, how to economize so much for themselves as they have for the public. It is a very important part, indeed I may say the chief business of our Association to study and discuss this economy of management and to demonstrate how we may give cheap transportation to the public and yet at the same time secure fair remuneration to the labor and capital employed in it. In this business, however much others may talk and resolve, it falls to our lot to be the men of action. It is by our co-operation that improvements are to be made and cheaper transportation secured. No political demagogue or idle philosopher will probably object to a combination for such a purpose. While debt and taxation and the wages of labor and the cost of material have greatly increased, there is no doubt at all that the railroads of the country have, in spite of these disadvantages, very greatly reduced the charges of transportation. They are therefore to be commended rather than censured for accomplishing great good under trying difficulties. If the high price of land and the low price of agricultural produce are to be charged to the railroads it is easy to see that it is not so much their rates as it is that their influence has stimulated over-production; and is that a sufficient reason why they should carry the excess at cost or surrender their charters?

No one people demand a sliding scale in charges to suit prices; but they want the scale to slide only one way, and that always downward. It is very noticeable that the seller will always get the highest price he can, whether the charge for transportation be high or low. But while the prices of commodities are regulated by the law of demand and supply, the charges of transportation gradually diminish with a regular increase of business. Railroads may therefore be justly credited with this difference from commercial men, that they do not raise the price of transportation with every excess of demand. The reason is plain: the cost of transportation does not increase in proportion to the increase of traffic. It is as expensive some times to do a small business as a large one. On some of the leading trunk lines the rates have diminished 30 to 40 per cent. in five years, and at a much faster rate per cent. than the rate of tonnage increased. Seeing and admitting the fact, however, that low rates must prevail, it is evident that the prosperity of railroads must depend on the increase of the volume of traffic, on improved machinery and on approximation, as nearly as possible or as may be justifiable, to double tracks of steel rails. While such a condition may be regarded as a prosperous one, it is also just the condition needed, with an increase of traffic, to justify low rates. When that condition of low rates with fair remuneration to capital and labor involved is reached, every railroad company will rejoice as sincerely as the most clamorous partisan of cheap transportation.

In obedience to the resolution adopted at our last meeting, at St. Louis, in January, the Secretary addressed a circular to the officers of every railroad in the United States and Canada, notifying them of the change of the name of the Association, setting forth the objects in view and inviting them to become members. Since then forty-four new members have been enrolled, so that the Association now numbers the managers of 108 railroads. The name of the Association is no less comprehensive than its aim and objects. Its members represent a network of railroads that is becoming more and more extended and complicated. Order, system, harmony, good understanding and perfect good faith are very desirable. Uniformity in many principles and modes, in signals, and in much of the machinery of movement and interchange, is very essential. Evil results and interruptions arising from local arbitrary rules, agreements and local interests, and the banding together of one set of interests against another set, may be overruled. All may be brought into harmony of work and operation for the common good. By association, whether meeting for personal discussion, or acting through a representative bureau, that may be accomplished which we could not while acting separately. Connected through lines, while exciting the apprehension of the ignorant, on account of supposed combinations of power, we operate more cheaply than short, disjointed and disconnected lines, and are therefore established and worked really in the interest of cheap transportation.

The list of subjects entered for discussion and reports, illustrates and shadows the possibilities of the Association.

How to secure full work or fair pay and fair treatment of cars running over foreign roads, far from home and long absent, is a problem of great importance. The proper enforcement of contracts, and the maintenance of good faith in respect to them, deserve our serious consideration. Whether free passes are to be continued or wholly abolished; whether commissions paid for the procurement of business are to continue to increase, or may not be got rid of altogether. A system of train dispatching which shall be absolutely reliable and certain, so far as anything human can be, is of the greatest importance, not only as involving the prevention of accidents, the saving of life, limb and property, but as involving the great secret of success in railroad management—the way to keep all the wheels in motion. The successful solution of one such problem in each year would justify the best efforts of this Association and its continuance in office, and earn us the gratitude of thousands.

I am fully aware that there are no greater slaves to business than railroad men. Their duties are very exacting and continuous. They are, as it were, parts of the great machine; their presence cannot long be dispensed with. Hence we may not expect them to so command their time as to be present at all these meetings of the Association. And this is to be regret-

ted, as there is nothing like discussion to bring out the points of a subject. Again, they find very little time to sit down and put their thoughts upon paper, and collect and collate the results of their experience. Yet this is the only kind of knowledge that is valuable to us in this Association. How to bring out this knowledge, where the sources are so widely scattered, and crystallize it into form so that it may be available for practical use, is another one of the problems the Association is dealing with. Upon this point we depend much upon individuals, and upon committees to whom given subjects are referred. The studying and investigation of such subjects, the patient collection of statistics asked for, painstaking in the replies to inquiries addressed to them in circulars, the imparting of any special knowledge possessed by each one on the topic under inquiry, and the proposal of matters for discussion, are duties which, if cheerfully and promptly performed, would aid very much in accomplishing the object we have in view.

A communication will be laid before you which has been received from the President of "The New England Association of Superintendents of Steam Railways," conveying the goodwill of their Association.

A committee from the General Passenger and Ticket Agents' Association will wait on you at this meeting. I understand one of their objects is to bring before you the question of good faith, and to illustrate the bad effects of a want of harmony in the government of through business. You will also be applied to for a hearing by a deputation from the Brotherhood of Locomotive Engineers, to explain the object of their Society and to discuss the question of strikes and their prevention.

Gentlemen, in acknowledging the great honor conferred upon me in re-electing me President of your Association, allow me to add that I shall most cheerfully perform any duty, within the sphere of my office, which may be required to advance the essential interests and great objects of the Association. I take the liberty to say that your Corresponding Secretary, Henry E. Sharpe, has been very assiduous and devoted in the discharge of his duties, and that you may unhesitatingly call upon him to perform any honorable service within the scope of his office.

REPORT UPON THE QUESTION OF ADOPTING A UNIFORM SYSTEM OF NATIONAL TIME FOR TIME-TABLES.

The undersigned, to whom was referred the question of adopting "a uniform system of national time for time-tables," beg leave to report that they have examined Mr. Charles F. Dowd's proposed system, and find it well adapted to the purpose aimed at, and are of the opinion that should it appear that the public demand a more regular and uniform practice than the present, Mr. Dowd's plan would be worthy of a trial. The Committee are of the opinion, however, that the disadvantages the system seeks to avoid are not of such serious consequence as to call for any immediate action on the part of railroad companies. While many passengers travel long distances, the great body travel only short distances, and to them the proposed uniformity is of little or no importance; and the comparatively slight advantage it would be to a passenger to have any more convenient method of computing the difference of the time of his watch from that of the locality in which he is temporarily sojourning does not seem, in the minds of the Committee, to call for a movement so broad as the one proposed.

The Committee therefore recommend that the question of a uniform standard of national time for use on railroads be deferred until it more clearly appears that the public interest calls for it.

ROBERT HARRIS,
Chicago, Burlington & Quincy Railroad.

E. J. BARNEY,
Selma, Rome & Dalton Railroad.

REPORT ON INTERCHANGE OF CARS.

Your Committee, appointed under resolutions of the Association adopted January 16, 1873, respectfully submit the following:

That while admitting the necessity of a more systematic method of transacting the business referred to, they recognize and appreciate the difficulties to be surmounted.

The subject under consideration is of very great importance to all railroads that exchange cars.

With ample power and other facilities for business, upon the actual movement of their rolling stock all roads must depend for their receipts.

We assume that most important lines of roads have a fair supply of cars for their business, provided they are loaded and unloaded promptly and returned from foreign lines without delay.

The use of cars by consignees as storehouses at terminal points, more especially where there are competing lines, is an evil that no individual or corporation, railroads excepted, would submit to. Every railroad manager knows that competition causes submission to this evil, and a united action on the part of railroads should be taken to force the unloading or the collection of a *per diem* demurrage.

After due consideration, we conclude that the following method has advantages over all others that have suggested themselves to us.

We would recommend that the usual mileage rate of $\frac{1}{2}$ cents per mile run be continued, and that each railroad party to this arrangement instruct their agents at junction stations to compute with the agent of connecting lines any demurrage that may be levied under these rules for the detention of cars on the following basis:

Allow three days' grace for transfer at junction stations and for unloading at destination; one day for a distance of 75 miles, or under; one day for each additional 75 miles, or under; all detention over the above, for every day absent, a charge for 60 miles at the rate of mileage of $\frac{1}{2}$ cents per mile, this charge to be allowed under all circumstances, unless remitted by the road to whom it is payable, upon application from the proper officer of the road paying it, showing good and sufficient reasons for the remittance of such charge. The remitting of any demurrage charge to be left to the discretion of the party who should receive it, if paid.

Valid excuses for not charging demurrage might be classified:

Bad order of car from accidents; snow blockade; freight blockade; inability to move from causes strictly beyond the control of the party holding the car, such as washing away of bridges, etc. In the case of wreck, only a reasonable time should be allowed for clearing and sending the car home for repairs; or, if done by agreement by the company on whose road it is broken, it shall be done efficiently and promptly, with the understanding that unnecessary delay should make a demurrage charge proper.

Your Committee foresee the difficulty that will first arise in obtaining the consent of freight lines to allow demurrage charges, and the effect naturally arising from a want of unanimity in carrying out whatever rules may be adopted by this Association with roads not parties to this agreement, but think that, by leaving it discretionary with each road to remit any demurrage if they may see it to their interest to do so, would give such as may be in need of their cars an opportunity to enforce their return from foreign roads, or obtain compensation in part for the loss of their service.

A. MITCHELL,
General Superintendent Illinois Central Railroad.

I concur with the foregoing, with the qualification that to be effectual all Eastern lines shall join.

E. W. WOODWARD,
President Indianapolis & St. Louis Railroad.

E. G. BARNEY,
General Superintendent Selma, Rome & Dalton Railroad.

REPORT ON POSTAL CARS.

The following is the report of the Committee appointed to inquire into "the cost of transportation of mail and postal cars, to ascertain the basis on which the Post Office Department arranges compensation for the services rendered by the different railroad companies, and whether that basis is a proper one, or not; and, if not, to suggest a proper one," which was presented by Hon. Thomas Allen, Chairman, and read during the first day's session:

At the time when this Committee was appointed, the compensation given to railroad companies for mail service was arranged by the Postmaster-General under the act of Congress passed June 8, 1872, which provided as follows:

"SEC. 310. That the Postmaster-General shall arrange the railway routes on which the mail is carried, including those on which the service is partly by rail and partly by steamboat, into three classes, according to the size of the mail, the speed at which they are carried and the frequency and importance of the service, so that each railway company shall receive, so far as practicable, a proportionate and just rate of compensation, according to the service performed."

"SEC. 311. The payment for carrying the mail on any railway of the first class shall not exceed \$300 per mile per annum; on any railway of the second class it shall not exceed \$100 per mile per annum, and on any railway of the third class it shall not exceed \$50 per mile per annum; but if one half of the service on any railway is required to be performed in the night time, the Postmaster-General may pay 25 per cent. in addition to the above maximum rates."

"SEC. 312. That if the Postmaster-General is unable to contract for carrying the mail on any railway route at a compensation not exceeding the maximum rates herein provided for, or for what he may deem a reasonable and fair compensation, he may separate the letter mail from the other mail and contract, either with or without advertising, for carrying such letter mail by horse express or otherwise at the greatest speed that can be reasonably attained, and for carrying the other mail by wagons or otherwise at a slower rate of speed."

"SEC. 313. That every railway company carrying the mail shall carry on any train which may run over its road, and without extra charge therefor, all the mail matter directed to be carried thereon, with the person in charge of the same."

"SEC. 314. That all railway companies to whom the United States have furnished aid by grant of lands, right of way, or otherwise, shall carry the mail at such prices as Congress may by law provide, and, until such price is fixed by law, the Postmaster-General may fix the rate of carriage."

"SEC. 315. That the Postmaster-General may enter into contracts for carrying the mail with railway companies without advertising for bids therefor; and the Postmaster-General may allow any railroad company with whom he may contract for the carrying of the United States mail, and who furnish railway post-office cars for the transportation of the mail, such additional compensation beyond that now allowed by law as he may think fit, not exceeding, however, fifty per centum of the said rates."

On application to the Second Assistant Postmaster-General, he informed the Committee that "the rates of compensation paid were based upon the returns of the weight of the mails, the speed and frequency with which they were conveyed and the dimensions and appurtenances of the cars or apartments provided for the accommodation of mails and agents. By returns obtained on a uniform plan from nearly all the railroad routes in the country and carefully analyzed in the Department, it was found that on roads receiving \$50 per mile per annum the common average weight of mails per day carried the whole distance was 200 lbs.; on roads receiving \$75, the average was 500 lbs.; on roads receiving \$100, the average was 1,000 lbs.; on roads receiving \$150, the average was 2,000 lbs.; on roads receiving \$200 to \$245, the average was 2,245 lbs.; on roads receiving \$300, the average was 13,139 lbs., and on roads receiving \$375, the average was 18,470 lbs." The Postmaster-General further stated that so far as weight was concerned these averages were used as a guide in determining the rates to which the different roads were entitled.

In his recommendations to Congress for the year 1873, the Postmaster-General suggested payments on the basis above referred to, viz.:

For mails carried over the whole length of route with due frequency and speed and with sufficient and suitable room, fixtures and furniture, in a car properly lighted and warmed for route agents to accompany and distribute the mail:

For a daily average of 200 lbs., a compensation of \$50 per mile per annum.

For a daily average of 500 lbs., a compensation of \$75 per mile per annum.

For a daily average of 1,000 lbs., a compensation of \$100 per mile per annum.

For a daily average of 1,500 lbs., a compensation of \$125 per mile per annum.

For a daily average of 2,000 lbs., a compensation of \$150 per mile per annum.

For a daily average of 3,000 lbs., a compensation of \$175 per mile per annum.

For a daily average of 5,000 lbs., a compensation of \$250 per mile per annum.

\$25 additional for every 2,000 lbs. over 5,000 lbs. Weight to be ascertained by actual weighing during certain periods, as might be directed by the Postmaster-General. In addition to the above rates, the following to be paid for every line of railway post-office cars of sufficient size, fixtures and furniture, properly lighted and warmed and run once a day each way upon such trains as might be satisfactory to the Post Office Department, viz.:

\$25 per mile per annum for cars 40 feet in length.

\$30 " " " " 45 " "

\$40 " " " " 50 " "

\$50 " " " " 55 to 60 " "

The length of cars to be fixed by the Postmaster-General. In Congress these recommendations were accepted with the amendment that, "in case any railroad company now furnishing railway post-office cars shall refuse to provide such cars, such company shall not be entitled to any increase in compensation under any provision of this act."

The recommendations and the amendment were embodied in an act of Congress approved March 3, 1873, entitled "An act making appropriations for the service of the Post Office Department for the year ending June 30, 1874"—by which all the provisions relating to the carrying of mails by railway companies of the act of June, 1872, were repealed.

Under the new act the Postmaster-General is allowed no discretion. Uniform rates for all railroads are prescribed, based on weight carried and length of traveling post office. The impossibility of fixing a rate on any basis that shall be satisfactory to every railroad company needs no demonstration here. A rate that to one company would be amply remunerative, to another would not pay the cost of transportation. Congress might as well pass a law that all railroads shall be constructed at a uniform rate per mile.

The railroad companies of Pennsylvania and New York, through Representative Briggs, of Delaware, protested against the new rates, and addressed the Postmaster-General a letter, as follows:

"JANUARY 27, 1872.
SIR—The undersigned railroad companies respectfully represent:

"That many years since they introduced railway post-office cars upon their several roads, under assurances from the Post Office Department that they should be paid for their services; that they have been induced to continue to run such cars in the expectation of such payment; that they have never been paid for the use of said cars, but have been and now are furnishing, lighting, warming and running expensive railway post-office

selves, yet the formation of a railroad telegraph system was not at present practicable, owing to the fact that the majority of the railroads were under contract with the Western Union Telegraph Company.

The following is the resolution passed on the subject brought up by the Brotherhood of Locomotive Engineers:

"Whereas, a Committee of the Brotherhood of Locomotive Engineers has appeared before this Association, and through their Chief made known their aim and objects, and have expressed a willingness to satisfy any committee of this Association that they have no secret objects or ends not consistent with the discipline or proper management of railroads; that the tendency of their organization is to prevent and not promote 'strikes,' and disavowing entirely any connection with the violent action of a division of the Brotherhood upon the St. Louis, Kansas City & Northern Railway, and that their proceedings were irregular and disapproved by the Brotherhood at large; therefore

"Resolved, That the Association thanks Mr. Charles Wilson for the explanation of the objects of the Brotherhood of Locomotive Engineers, and that the Brotherhood is to be commended, so far as it aims to prevent strikes and to elevate the moral character and efficiency of locomotive engineers."

There was very little discussion on this resolution, the Committee being left in charge of the subject, and the Association feeling it due to the Brotherhood to acknowledge the presentation of the case by its officers and representatives.

The Association adjourned, to meet at the Grand Pacific Hotel, Chicago, on the 8th day of October next.

THE MASTER MECHANICS' ASSOCIATION.

Report of the Sixth Annual Convention.

The following report of the proceedings of the convention held last week in Baltimore we have compiled chiefly from the Baltimore papers, with many corrections. Our report of the first day's proceedings last week being very brief, we give a fuller report now:

FIRST DAY.

The session was held in Raine's Hall, Mr. H. M. Britton, Superintendent of the White Water Valley Railroad, President of the Association, in the chair, and Mr. J. H. Setchel, Master Mechanic of the Little Miami Railroad, Secretary.

After prayer by the Rev. J. H. Lightbourne, the roll was called, and the following members answered to their names:

H. Anderson, late of the Chicago & Northwestern Railway, Chicago, Ill.; H. M. Britton, White Water Valley Railroad, Cincinnati, Ohio; M. E. Brown, Erie Railway, New York; J. M. Boon, Pittsburgh, Fort Wayne & Chicago, Fort Wayne, Ind.; A. P. Burroughs, Marquette & Ontonagon, Marquette, Mich.; G. E. Boyden, Boston, Hartford & Erie, Boston; H. G. Brooks, Brooks Locomotive Works, Dunkirk, New York; W. E. Cooper, Erie Railway, Hornellsville, New York; N. E. Chapman, Cleveland & Pittsburgh, Cleveland, Ohio; S. M. Cummings, Pittsburgh, Fort Wayne & Chicago, Allegheny, Pa.; H. L. Cooper, Kansas City, St. Joseph & Council Bluffs, Kansas City, Missouri; D. Clark, Lehigh Valley Railroad, Hazleton, Pa.; J. A. Durgin, Pittsburgh Locomotive Works, Pittsburgh, Pa.; Wilson Eddy, Boston & Albany, Springfield, Mass.; Harry Elliott, Ohio and Mississippi, East St. Louis, Mo.; T. Evans, Catsaqua & Fogelsville, Catsaqua, Pa.; Howard Fry, Grand Trunk, Sherbrooke, Quebec, Canada; J. H. Flynn, Western & Atlantic, Atlanta, Ga.; C. Graham, Lackawanna & Bloomsburg, Kingston, Pa.; J. B. Gayle, Raleigh & Gaston, Raleigh, N. C.; G. W. Glass, Allegheny Valley, Pittsburgh, Pa.; E. Garfield, Hartford, Providence & Fishkill, Hartford, Conn.; T. G. Gorman, Toledo, Wabash & Western, Springfield, Ill.; C. T. Ham (late New York Central), Kelleys Lamp Works, Rochester, N. Y.; A. S. Hull, Cumberland Valley Railroad, Chambersburg, Pa.; W. S. Hudson, Rogers Locomotive Works, Paterson, N. J.; B. W. Healy, R. I. Locomotive Works, Providence, R. I.; W. L. Jordan, Cumberland & Pennsylvania, Mt. Savage, Md.; Thomas Jones, Catsaqua & Fogelsville, Catsaqua, Pa.; J. J. Kinsey, Lehigh Valley, Easton, Pa.; Thomas Kerr, Camden & Amboy, Bordentown, N. J.; S. Keeler, Flint & Pere Marquette, East Saginaw, Mich.; H. A. Little, No. 2043 Tower street, Philadelphia, Pa.; O. H. P. Little, Indianapolis, Ind.; C. M. Lewis, Northern Central Railroad, Baltimore, Md.; H. A. Lincoln, Shore Line Railroad, New Haven, Conn.; J. Lamb, Des Moines Valley, Keokuk, Iowa; J. B. Messer, Burlington, Cedar Rapids & Minnesota, Cedar Rapids, Iowa; R. McDowell, Belvidere Delaware, Lambertville, N. J.; W. McAlister, West Jersey Railroad, Camden, N. J.; J. McFarland, Richmond & Danville, Richmond, Va.; J. W. Philbrick, Maine Central, Waterville, Maine; G. W. Perry, Philadelphia, Wilmington & Baltimore, Wilmington, Delaware; A. J. Prescott, Catsaqua Railroad, Catsaqua, Pa.; T. W. Peoples, Central of New Jersey, Elizabethport, N. J.; G. B. Richards, Boston & Providence, Boston Highlands, Mass.; W. A. Robinson, Great Western of Canada, Hamilton, Ontario; D. O. Shaver, Pennsylvania Railroad, Pittsburgh, Pa.; J. H. Setchel, Little Miami Railroad, Cincinnati, Ohio; C. B. Street, Pennsylvania Railroad, Blairsville, Pa.; W. M. Strong, New York & Harlem, New York; A. J. Sanborn, St. Louis, Vandalia, Terre Haute & Indianapolis, Effingham, Ill.; W. H. Stearns, Connecticut River Railroad, Springfield, Mass.; W. B. Smith, South Carolina Railroad, Charleston, S. C.; G. H. Tier, Toledo Division Lake Shore & Michigan Southern, Norwalk, Ohio; John Thompson, Eastern Railroad, East Boston, Mass.; W. F. Turf, Cleveland & Pittsburgh, Cleveland, Ohio; J. K. Taylor, Old Colony, Boston, Mass.; C. H. Tull, North Louisiana & Texas Railroad, Monroe, Louisiana; A. B. Underhill, Boston & Albany, Boston, Mass.; J. Van Vechten, Atlantic & Great Western, Meadville, Pa.; W. G. Van Buskirk, Dutchess & Columbia, Fishkill, N. Y.; H. A. Whitney, European & North American, St. John's, N. B.; R. D. Wade, North Carolina Railroad, Company's Shops, N. C.; F. A. Waite, Boston & Maine, Boston, Mass.; W. Woodcock, Philadelphia, Germantown & Norristown, Philadelphia, Pa.; J. L. White, Evansville & Crawfordville, Evansville, Ind.; J. E. Waddy, Orange, Alexandria & Manassas, Alexandria, Va.; E. H. Williams, Baldwin Locomotive Works, Philadelphia, Pa.; J. E. Wooten, Philadelphia & Reading, Reading, Pa.

The following associate members answered to their names: W. B. Bement, Twenty-first and Calowhill streets, Philadelphia; M. N. Forney, RAILROAD GAZETTE, No. 73 Broadway, New York; J. O. D. Lilly, Indianapolis, Ind.; F. B. Miles, Ferris & Miles, Philadelphia; Coleman Sellers, Philadelphia, and J. Wheelock, Worcester, Mass.

The proceedings of the last session, printed in neat pamphlet form of 220 pages, were received, and approved without reading.

The Secretary read sections 1 and 2 of article 4 of the constitution, defining the qualifications of members.

The following gentlemen then signed the constitution:

W. H. Lewis, Morris & Essex Division of Delaware, Lackawanna & Western Railroad, Hoboken, N. J.; N. Stungland, Connecticut Western Railroad, Hartford, Conn.; C. W. Hollister, Connecticut Valley Railroad, Hartford, Conn.; Frederick C. Dosey, Michigan Central, Jackson, Mich.; C. C. Elliott, Iowa Division Chicago & Northwestern, Clinton, Iowa; Robert King, Wilmington, Columbia & Augusta Railroad, Charlotte, N. C.; Thomas B. Pervis, Boston & Albany, Greenbush, N. Y.; C. H. Brown, Delaware, Lackawanna & Western, Utica Division, Utica, N. Y.; Joseph Elder, Rockford, Rock Island & St. Louis, Beardstown, Ill.; Henry Hanford, Naugatuck Railroad, Bridge-

port, Conn.; John F. Crockett, Boston, Lowell & Nashua, Boston; A. Gould, New York Central, Rochester, N. Y.; J. F. Setchel, New York & Oswego Midland, Wortendyke, N. J.; Peter Clarke, Northern Railway of Canada, Toronto, Canada; Ezra Osborn, Grant Locomotive Works; J. G. Hubbard, Erie Railway, Buffalo; Wm. H. Ellis, Cattawissa Div., Philadelphia & Reading Railroad.

The President then read his annual address, which we published in full last week.

SECRETARY'S REPORT.

The Secretary then read his report:

H. M. Britton, Esq., President American Railway Master Mechanics' Association:

DEAR SIR—I herewith hand you my official report of membership of the American Railway Master Mechanics' Association, and moneys received during the year ending May 13, 1873.

Within the past two years eleven members of this Association have requested that their names be dropped from the list, viz.: Josiah Betters, T. Demmed (since deceased), S. D. Danfield, G. H. Griggs, D. W. Haines, J. N. Moore, John Block, C. N. Parker, E. D. Palmer, W. Swanston and E. A. Walker, five of whom have resigned on account of engaging in other business, two on account of not being able to pay their dues, and one on account of not being able to attend the convention, and three have assigned no reason for withdrawing.

Since the last annual meeting seven members have joined the association by paying the initiation fee of one dollar, and authorizing me as Secretary to sign the constitution and by-laws for them, as provided for in section 1, article 4.

The total number of members at the present time is two hundred and twenty-two (222).

The total amount of moneys received during the past year is \$2,067, for all of which I hold the Treasurer's receipts.

The total amount of assessments due the Association for delinquent members is \$502. Very respectfully,

J. H. SETCHEL, Secretary.

The Treasurer, Mr. Hayes, being absent, his report was not received.

The President announced that before proceeding with reports of committees, there were some invitations to the Association which should be disposed of, as the committee was anxious to hear the pleasure of the Association, and a Committee on Correspondence should be appointed to consider such communications.

On motion of Mr. N. E. Chapman, a Committee on Correspondence was appointed, to whom was referred the communications referred to.

The President appointed Messrs. N. E. Chapman, of Cleveland & Pittsburgh Railroad; W. A. Robinson, of the Great Western of Canada, and J. H. Flynn, of the Western & Atlantic Railroad, as Committee on Correspondence.

INCORUSTATION OF BOILERS.

The first paper read was from the Committee on the Operation and Management of Locomotive Boilers, including the Purification of Water, consisting of Messrs. H. A. Towne, Hannibal & St. Joseph Railroad; A. H. De Clercq, Toledo, Peoria & Warsaw, and Harry Elliott, Ohio & Mississippi.

The report treats of a matter of great interest, not only to railroad men but to all manufacturers who use steam engines. The incrustation of boilers is a source of constant annoyance and expense and danger. The report states that French engineers estimate the waste of fuel from this cause to be equal to forty-five per cent. of the whole amount consumed. It prevents the contact of the water with the iron, causing the plates to be greatly overheated, and they rapidly burn out. Frequent repairs are made necessary, and boiler explosions are sometimes occasioned by the incrustations dropping from the overheated plates and permitting the water to come suddenly in contact with the hot surface, thereby generating immense volumes of steam, which produce the concussion that ruptures the boiler.

The Committee have no faith in any of the patent devices which are advertised as sure preventives to incrustation. The only effectual remedy is to use pure water. Some attempts have been made to purify water impregnated with mineral substances before it is allowed to enter the boiler, but the results have been indifferent. The boilers of ocean steamers suffer greatly from the hydro-chloric acid which seems to be developed by the distillation of the salt water. The Committee, assisted by Professor Sewell, of the Illinois State Normal University, analyzed a gallon of sea water obtained at Minto's Ledge, near Boston Harbor, and found traces of hydro-chloric acid after the water had been evaporated and reduced to liquid form by condensation. A member of the Committee (Mr. Towne) has invented a condenser which assists in purifying water, but it can only be used on steamboats and in stationary engines. For locomotives the only remedy suggested is the use of rain water. The Committee make a calculation to show that the storing of rain water in reservoirs in sufficient quantities is practicable. In Missouri, for instance, the annual rainfall is 41 inches. A reservoir covering one acre, and having a depth of 16 to 18 feet, with a roof or collecting surface of four acres, would receive 4,573,810 gallons of water in a year. On a section of 100 miles of railroad five of these reservoirs, located at intervals of twenty miles, would receive 22,869,000 gallons. A locomotive that does an average year's work (31,200 miles) consumes about 1,099,500 gallons of water; if the tonnage over the given section required the use of twenty engines the five reservoirs would contain more than enough to supply them.

The Committee are of the opinion that in the course of time the saving in repairs to boilers would repay the amount expended in constructing these reservoirs. The annual cost of repairs to a locomotive made necessary by the use of impure water is about \$750.

The use of surface water (that which flows in rivers and creeks) is recommended whenever it can be procured, and even ponds may be availed of when they happen to be located near the railroad. In this way the average quality of the water may be improved and the average loss occasioned by incrustation may be diminished.

The report was debated by Messrs. Coleman Sellers, J. O. D. Lilly, J. H. Setchel, W. Woodcock, T. G. Gorman and others. Mr. Lilly moved that Messrs. T. W. Peoples, of Elizabethport, N. J., and Coleman Sellers, of Philadelphia, be added to the Committee, which was adopted.

The Secretary read a letter from Mr. H. A. Towne, of the Committee, stating that he had been at \$50 expense, which, on motion, was ordered to be refunded him.

A resolution of thanks was also adopted to Prof. J. A. Sewell, of the Normal University, Illinois, for making the analysis for the Committee.

Mr. Howard Fry, of the Grand Trunk Railway, presented a motion that the Committee appoint some competent person to make such analysis of water as might be submitted to him by the different roads, each road to bear the expense of water so submitted. Adopted.

Mr. W. S. Hudson, of the Rogers Locomotive Works, Paterson, N. J., stated his opinion on the subject of analyzing waters.

Mr. Setchel offered a resolution that no expense be incurred by any committee without the unanimous consent of the General Supervisory Committee, given in writing by the Chairman, stating the amount to be expended. Adopted.

The consideration of the report was then closed. The Committee on Correspondence reported in favor of accepting the following invitations:

Tuesday afternoon, 1½ o'clock—Excursion to Annapolis.

Wednesday 4 p. m.—Carriage ride from the Carrollton to Druid Hill Park.

Thursday, 3 p. m.—By Baltimore & Ohio Railroad to Mount Clare, etc.

Friday, as soon after 8 a. m. as practicable—Excursion to Washington by the Baltimore & Ohio Railroad.

Saturday, 8 a. m.—Excursion to New York, carriage drive through Central Park and banquet at 8 o'clock p. m. at the St. Nicholas.

The following invitations were declined with regret:

From Union Railroad to visit tunnel.
From Canton Company, to visit lands and improvements.
From Baltimore & Potomac Railroad to visit Gettysburg.

Mr. Morris Sellers, of Westinghouse Air-Brake Company, Pittsburgh, moved to go to New York via Gettysburg. Adopted. The balance of the report was then adopted.

The Secretary announced that a prize having been offered at last session for the best drawing, a party at Warsaw had forwarded a model of a snow plow for competition.

Mr. M. N. Forney, of the RAILROAD GAZETTE, New York, of the Committee, decided that as the model was not a drawing it could not be considered by the Committee.

The Committee on the Comparative Value of Anthracite Coal, Bituminous Coal and Wood for Generating Steam in Locomotives reported progress and was continued.

Mr. Setchel moved the appointment of a committee of three to select subjects for discussion at the next session. Adopted, and the chair appointed Messrs. M. E. Brown, of the Erie Railway; Howard Fry, of the Grand Trunk, and Mr. A. B. Underhill, Boston & Albany, Boston, Mass.

The convention then, at one o'clock, adjourned.

THE EXCURSION TO ANNAPOLIS.

At five minutes of 2 o'clock the steamer Theodore Weems, Captain Gourley, left Pier No. 8, Light street wharf, with 94 ladies and 229 gentlemen on board, for the excursion to Annapolis. There were but few Baltimoreans on board, the party consisting mainly of the "master mechanics" and their families. The trip was a pleasant one down to Annapolis, and a slight rain that fell in no way interfered with the pleasure of the excursionists. Shortly after passing Seven Foot Knoll, dinner was served by Mr. Remert.

It was an elegant repast in every respect. The ladies were accommodated at tables in the ladies' cabin, while in front long tables were arranged for the accommodation of others. There was abundance of everything and plenty of waters, so that all were promptly served. The Fifth Regiment Band furnished the music for the trip, but the ladies kept the piano busy, and there was some vocal music.

Arriving at Annapolis, the company witnessed a sham battle by the cadets at the Naval Academy; also a parade by the midshipmen and marines. The band of the Academy played a number of selections from the pagoda in the centre of the grounds, and the visitors were shown through the institution, and many visited the State House and Governor's mansion. The statue of Judge Taney attracted much attention, but the chief point of interest was the present Senate Chamber, in which Washington resigned his commission. At about 6 o'clock the steamer started on the return. The weather was delightful, and the trip much enjoyed. Everything passed off well, and Captain Mason L. Weems, Captain J. Gourley and the committee can congratulate themselves that their efforts to please all were crowned with success. The steamer arrived at the wharf at 8½ o'clock.

The committees having charge of the entertainment of the American Railway Master Mechanics' Association while in Baltimore are as follows:

Executive Committee (red badge)—German H. Hunt (chairman), of Poole & Hunt; H. Irving Keyser, of Keyser Brothers & Co.; W. J. Cochran, of Baltimore Car Wheel Company; W. C. West, of C. West & Sons; W. S. G. Baker, of Baltimore Car Wheel Company, and William Reed (secretary), of Morton, Reed & Co.

Reception Committee (red badge)—Wm. Reed (chairman), T. C. Basshor, G. S. Dickey, D. Bowly Thompson, John Bollman, W. J. Cochran, H. J. Keyser and W. C. West.

Committee on Invitations—G. H. Hunt, W. S. G. Baker, O. A. Parker.

The members of the Association have a blue badge, with the name of the Association in gilt letters, and the guests had white badges, with the words "invited guests" in black letters.

During the trip a large envelope was presented to each delegate, containing an invitation, in a special train, to Philadelphia and New York; an invitation to a drive through Central Park, New York, on Saturday, and an invitation to a banquet at the St. Nicholas Hotel on Saturday evening.

Accompanying these invitations was a superb pamphlet, containing the programme for the reception in New York, with the list of committees and a list of contributors toward the expense.

SECOND DAY.

Shortly after 9 o'clock Wednesday morning, Mr. H. M. Britton, of Cincinnati, President, called the convention to order. The members were not present in force and gathered slowly.

The President announced that the Finance Committee, E. O. Hill, George A. Coledge and S. M. Philbrick, were absent, and it would be necessary to have a new committee to examine accounts and fix the assessments, as some of the members wished to leave shortly.

Mr. N. E. Chapman, of Cleveland, moved the appointment of a new committee, which was adopted and the Chair appointed F. A. Waite, Boston & Maine Railroad, Boston; J. Van Vechten, Atlantic & Great Western Railroad, Meadville, Pa.; and J. Kelley, Providence & Worcester Railroad, Providence, R. I.

COMPARATIVE VALUE OF FUELS.

The President announced that the discussion of the report of the Committee on the Comparative Value of Anthracite Coal, Bituminous Coal and Wood for Generating Steam was in order.

Mr. W. A. Robinson, of the Great Western Railroad, Hamilton, Ontario, said that he would again call attention to the importance of careful reports on coal and wood, not only in reference to evaporating power, but financially. Printed reports should be made intelligible. The manager of his road received a report from a railroad that they used a cord of wood every 33 miles and a ton of coal every 48 miles, and asked him to explain the discrepancy between this and his reports. He analyzed the statement, and found that the results gave a false impression, and he reduced the figures to 27 miles to a cord of wood and 31 miles to a ton of coal. The best results were doubtless attained by careful and systematic firing and not by the use of patents. The smoke boxes in America were too small; in Europe they are 30 per cent. larger. Here, small as they are, they are filled with "petticoat" pipes. The reports should be divided under three heads—passenger traffic, freight traffic and piloting and shunting. With the small box there is a sharp blast used; the draught is very great and forms a vacuum. Increasing size of smoke-box has the same effect as an air vessel has on a pump. Sparks and cinders will fall to the bottom of the box, and will not go up the chimney. In Europe they do not use the obstructions used here, such as smoke-burning stacks, etc. He took one of these stacks and tried it, and found it increased the consumption of fuel 15 or 20 per cent.; on its removal and the old stack substituted the percentage dropped at once. He would inquire for information on this subject.

Mr. J. H. Flynn, of the Western & Atlantic Railroad, Atlanta, Ga., asked whether the Association had ever adopted a uniform system of reports, and whether it had been received by the master mechanics. The President stated that at the third annual convention a uniform system of reports had been recommended. Mr. Setchel stated that correspondence had been

held with the Superintendents' Association in regard to the mileage of engines, and the matter is to be laid before the next meeting of that Association, when some uniform system will be adopted.

Mr. Philbrick favored the burning of coal.

Mr. Sprague thought that the small smoke-box used in this country was better than the large box. He had often been obliged to contract boxes in order to obtain satisfactory results.

Mr. Wells said that he thought the large boxes would act as air-chambers in equalizing the draft. In the small box the vacuum would be carried sooner into the fire-box and act with greater rapidity. With a small box the coals would be lifted with each exhaust from the grates. With a large box the draft would be gradual and even. The large box would be at a disadvantage if it had a flat bottom. The particles of coal would settle down and be carried around, abrading the pipe.

Mr. Fry asked what was the action produced by the burning of coal on fire-boxes and tubes? If the effect produced is chemical, steel fire-boxes and iron tubes should be used; if the effect produced is mechanical, copper fire-boxes and brass tubes must be used.

Mr. J. L. White, Evansville & Crawfordville Railroad, Evansville, Ind., said he had used copper fire-boxes, and he burned coal. He also used copper flues; found they answered very well, until he went to repair them, when they did not pay. Particles of coal wear them out, and they would collapse. Found copper fire-boxes scoured out also, and looked worn around rivet heads. A large fire-box was better than small, and lasted longer. He recently converted some wood-burning engines to coal-burning engines. At first did not enlarge fire-boxes, but did so recently, and they have done better. It acts as a sort of air-chamber, and the exhaust does not jerk the fire. Particles pass gradually, but remain at bottom more than they would in smaller boxes.

Mr. W. S. Hudson asked the preceding gentleman how he enlarged the boxes.

Mr. White explained the *modus operandi*.

Mr. Harry Elliott, of the Ohio & Mississippi Railroad, East St. Louis, Mo., said much of the solution of the present question depended upon fuel. Some fuel required soft and some sharp blast, and in this country, the speaker asserted, they were compelled to use fuel requiring sharp blast, and therefore they must use the smaller box. On his road they used light fuel, which passes off with the blast. On some roads the coal was heavy, and had no tendency to be carried off as burning cinders. He found that the arrangement of the petticoat pipe was of the greatest importance.

Mr. Edly said that the reason why the copper tubes scoured out so soon was that they were not made heavy enough. He never used a tube of less than number 11 wire gauge, and never knew one of them to wear out. I have, said he, superintended the building of over one hundred engines, and I have never used less than number 11, or even number 10 tubes. The size of fire-boxes has, in my opinion, very little to do with it. The adjustment of the tubes, fire-box, etc., will remedy the difficulties.

SAND BLASTS ON COPPER, STEEL AND IRON.

Mr. Coleman Sellers said that Gen. B. C. Tilghman, while experimenting with the newly-discovered sand-blast on a copper surface, found that when the blast was thrown directly against a copper surface it cut the surface scarcely at all; but if it struck at a certain angle, it would cut copper very rapidly. If cast directly against steel or iron, it cuts very easily, so that in cleaning off copper the sand-blast might strike it directly and cut off the incrustation without cutting the copper; so that the particles of coal striking the surface of copper tubes obliquely must scour them out very rapidly, as does the sand-blast. Hence iron is preferable to copper in the manufacture of tubes.

Mr. Wells said that if coal would scour out a thin tube, it would also, in proportionate time, scour out a thick one.

Mr. Robinson said it must be admitted that brass and copper conduct heat quicker than iron. Copper won't do for coal, but brass might, if made hard and tough, and not brittle. He had estimated that brass lasted half the life of an engine, and iron would not do more. Iron corrodes quicker, and scales collect and have to be scraped every two years, while brass is good for four years. Brass is a saving of labor and quicker in heat. In Europe they last six to seven years, then need new ends at the fire-box, and then the boiler is good for three years more. He alluded to the small coal used on American roads, and said that he had attempted to have the fire-door open while running, but as soon as night came this destroyed the view of the road by the engineer. He proposed to have a fire-door projected at the top, in addition to the fire-door for fuel. He offered a resolution that the Committee on Coal and Wood as Generators of Steam in Locomotives request information as to proportions of area of smoke-box, tubes and fire-grates, and that they request all master mechanics to divide fuel-sheets into three divisions—passenger, freight and piloting and shunting. Adopted.

Mr. Hudson said that brass tubes broke off. He would like to have all information possible on the subject.

Mr. Coleman Sellers, of Philadelphia, detailed interesting experiments by Prof. Tilghman of cutting metals with a sand-blast. It cuts scales out of castings, but the impression in brass was but trifling. He was of the opinion that iron and steel were the best.

Mr. T. G. Gorman, of the Toledo, Wabash & Western Railway, Springfield, Ill., said he used iron flues, as brass flues would not answer on his road.

Mr. Fry said he had learned from the discussion that brass tubes, if thick enough, can be used. He wanted now to ascertain the quantity of coal burned per mile. It took three pounds of wood per car per mile.

Mr. Eddy urged the superiority of the brass over iron tubes. Mr. J. A. Durgin, Pittsburgh Locomotive Works, asked if any one had had any experience with steel tubes.

Mr. Hudson said the Pennsylvania Railroad had some in use. Mr. Boon said as long as they lasted they were good, but when new ends were to be put on they broke off.

Mr. Fry gave some statistics as to burning of coal. He had made thirty-two miles to ton of coal, at an average of fifteen miles an hour, at a light grade.

Mr. Robinson said he would like also to know what was the extra loss in keeping in running order an engine burning wood and one burning coal. He had estimated its cost in depreciation of life of an engine 1 per cent. per mile run. The cost of extra fire-box and set of tubes was estimated, and gave that result.

Mr. Gorman—Another item of expense that must be calculated is the time the engine is idle; another expense was that in wood-burning engines the valve-seats need not be touched for years, while in coal engines it must be done once a year.

Mr. J. Losey, Louisville, New Albany & Chicago Railroad, New Albany, Ind., said that he burned coal in a wood-burning country. The comparative cost was hard to ascertain. He burned coal at from \$3 to \$3.75 per ton when wood was \$1.75 or \$2 per cord.

Mr. Ham inquired why the preceding gentleman used coal instead of wood?

Mr. Losey stated he could not explain.

Mr. Robinson hoped that in the reports the price of the fuel would be mentioned.

On motion of Mr. Elliott, the discussion was closed.

Mr. M. Sellers, of Pittsburgh, called attention to the statement of the Baltimore *Gazette*, that though his motion to visit Gettysburg had been adopted, there was some misunderstanding, and many of the delegates would go direct to New York.

In order that the convention might decide the matter definitely he would ask a reconsideration of the vote by which his motion to visit New York via Gettysburg was adopted. The invitation of Mr. Durberry should receive more than a courteous refusal.

The resolution to reconsider, after some debate, was adopted, and the resolution laid on the table.

The President decided that the invitation to New York stood accepted by the adoption of the report of the Committee on Correspondence.

Mr. Setchel was opposed to accepting any invitation for the convention after the adjournment, and moved that the report of the Committee be reconsidered, which was lost.

POWER BRAKES.

The President announced the next matter in order was the report of the Committee on the Construction, Operating and Cost of Maintaining Continuous Train Brakes. This committee, consisting of J. M. Boon, of the Pittsburgh, Fort Wayne & Chicago; J. Johann, late of Missouri Pacific, and W. S. Hudson, Rogers Locomotive Works, presented their report, which was read by the Secretary.

The report stated that circulars were issued containing questions bearing upon the subject, by which a great amount of information was obtained, the experience of various roads being given, as compiled from the replies of the officials to the questions addressed. Improvements in regard to the Westinghouse brake were reported to have been made, by which the brake could be applied for any car, so that in case of the breaking of a coupling the detached section would be stopped, independently of the rest of the train. The effect upon the wear of car wheels was considered, and statistics upon the subject presented. The replies indicated that the air brake was considered as very effective in preventing accidents. There are some complaints in regard to the pump, the defects being in the valves. The danger of the brake not working when needed and the breaking of a train into sections were discussed, and it is thought that such danger can be obviated by simple means. The Committee find that the saving of expense by the air brake in regard to the wear and tear of the wheels and other machinery is very great, and justify its use from an economical point of view. The safety of the passengers also demands its use. The defects in the pump valve are caused by inexperience in the management of the pump, and with practice will disappear. The Committee think that much of the complaint against the complicated nature of the apparatus arises from the fact that it is as yet a new thing. The air brake was on the whole commended as being the best brake yet in use.

The report on compression brakes was read on the conclusion of the former. The Committee consists of A. Mitchell, Lehigh Valley; F. A. Waite, Boston, Mass.; and George H. Griggs, Worcester, Mass.

The merits of various compression brakes were considered, and their immense superiority to the old hand-brakes was asserted. Both reports were accepted, but not discussed.

At fifteen minutes of twelve o'clock the convention took a recess of ten minutes.

FINANCIAL REPORT.

The Secretary read a report, submitted by the Finance Committee. The report was adopted, and also a suggestion it contained advising a levy of \$10 upon each member to meet current expenses.

Mr. Lander, of Concord, N. H., wished to know how the assessment was to be made, and proposed that a notice should be sent to each member.

The President suggested that as the members were all ready to pay the tax, it would be better to appoint a committee to visit them at their seats. The proposition was accepted, and the Finance Committee, Messrs. Waite, Kelly and Van Vechten, was instructed to make the collections.

Messrs. J. T. Robinette, Atlantic, Mississippi & Ohio, South Side Division; J. W. Eastman, Nashville & Chattanooga; and W. Bell Smith, South Carolina, a committee appointed to report on the relative cost of operating roads of gauges of three feet six inches or less, and those of the ordinary four feet eight and a half inch gauge, made no return.

NARROW-GAUGE RAILROADS.

An article on narrow-gauge roads, by Mr. W. W. Evans, New York, was then read by the Secretary. Accompanying the letter were two pamphlets, one containing letters written at the request of one of the chief officers of the British government, and the other devoted chiefly to a review of the first pamphlet, by Benjamin H. Latrobe, "the engineer," says Mr. Evans, "that built the Baltimore & Ohio Railway, who holds among engineers a high position for great experience, ability and calm, clear judgment." Mr. Evans said that the cost of the transport of goods on a railway will depend very much on conditions and local circumstances, such as gradients, curves, climates, distance, amounts to be carried, speed, etc.

There can be no doubt but that a light railway, with everything to correspond, and a light business to transact, can be used to a much better advantage than a railway built with heavy rails, engines, cars, etc., on the same line to do the same work. The Festiniog Railway, in Wales—the model narrow-gauge—divides dividends on shares which represent less than half the cost of the railway, and also charges very high rates for carrying goods. Hence its large profits. If our standard-gauge roads were to continue their charges for carrying per ton per mile, and were put to the same expenses as the Festiniog road, they would soon become bankrupt. Small cars are the best for local traffic, but large, long, eight-wheel cars are the best for through traffic where the freight is considerable.

Narrow-gauge tracks are more difficult to keep true to grade and line, as it will be impossible to keep the center of gravity of engines as low in proportion to gauge for a narrow as for a standard gauge. Consequently the lateral oscillations of engines will tell with more force on the track. Cars of like strength to carry like loads at like speed on the same sized wheels will probably cost the same for narrow as for standard gauge. After a diligent study of the subject I am perfectly convinced that a light narrow-gauge railway cannot be operated any more economically than can a light standard-gauge railway.

The only advantage the narrow has over the standard gauge, is a slightly greater facility in traversing sharp curves, and also a slight economy in construction of roads, chiefly from decreased top width of embankments. Mr. Evans had recited a number of disadvantages peculiar to the narrow-gauge road, viz.: narrowness of embankments and consequent risk in running over them; want of stability; longer cars, and hence not so manageable; difficulty in traversing curves, and consequently great flange frictions; narrowness of the cars, and hence want of accommodation and difficulty of constructing suitable engines. Many kinds of gauges were tried in England when railroads were first built, and George Stephenson, the father of railroads, and other eminent men, decided on the "broad gauge." When the English government changed the gauge of railroads to be built in India from 5 feet 6 inches to 3 feet 3½ inches, many eminent engineers proclaimed it a national calamity. The standard gauge was probably established before railways were known, perhaps 2,000 years ago, as shown by the ruins in the stone pavements of Herculaneum and Pompeii. The first railroad ever built in Austria was a narrow gauge, and failed.

Mr. Forney, of the RAILROAD GAZETTE, thought that the main question involved in the discussion on the merits of narrow-gauge railroads was whether cars of the same strength and capacity for such roads would weigh materially less than if made of the standard 4 feet 8½ inch gauge. He wished some gentleman of experience upon the subject to give his views.

Mr. Ross, of the Memphis & Charleston Railroad, had not been connected with narrow-gauge roads long enough to express an opinion as to their merit.

Mr. Fry, of the Grand Trunk Railway, proposed that during the coming year all the facts bearing upon the matter should be collected and a report be made at the next convention, giving everything of interest connected with the subject of narrow-gauge roads.

Mr. J. Lilly, of Indianapolis, inquired if Mr. Forney had not prepared a paper on the subject.

Mr. Forney replied that he had not.

At this stage the President informed the Association that he had received a package of cards inviting the members to a drive that evening. He also asked them to appoint an hour at which they would visit the Mount Clare Works Thursday. Half-past three was fixed upon.

The discussion of narrow-gauge roads was then resumed.

Mr. Sprague, of Pittsburgh, believed that it would cost less to work narrow-gauge roads, and for that reason they would be found desirable in the South and the remote sections of the Union.

Mr. Forney, of the RAILROAD GAZETTE, said the gentleman assumed the point at issue, and asked his reasons for supposing narrow-gauge roads could be worked at less cost than broad gauge.

Mr. Sprague—I will undertake to build an engine for a narrow-gauge road cheaper than one of the same capacity for a broad-gauge road, and there will be a corresponding increase in every other article of rolling stock.

Mr. Hudson, of Paterson, N. J., thought that where it is desirable to build a cheap road it would be better to have lighter rails and lighter rolling stock, and adhere to the broad-gauge system.

Mr. Sellers, of Philadelphia, wanted to know why a report was not made.

Mr. Robinette, Chairman of the Committee on Narrow-Gauge Roads, replied that he did not consider it a part of the duty of a Master Mechanics' Convention to discuss the relative merits of different systems of road-beds, and consequently the Committee made no report.

Mr. J. H. Setchel said that with the progress in the development of the West the narrow-gauge railroads are already becoming wider. The people must have and will have broad-gauge roads; they can afford to pay for them as they do pay for Pullman palace cars, and if they wish them it is none of our business.

Mr. Fry thought that the subject of narrow-gauge roads was one of great importance. He had seen representatives of contemplated roads in the Russian and Indian empires meeting together in order to consider the subject, and if it was worthy of their attention it was certainly worthy of the attention of the convention.

Mr. Robinette thought the discussion was encroaching upon the ground of the civil engineer.

Mr. Smith, of Pittsburgh, said some persons once had the impudence to call him "narrow-gauge Smith," because of his fondness for narrow-gauge roads. Certainly he had great experience in them. There is great difference in the capacity of the pulling power of the narrow and the broad gauge locomotives, though this might be accounted for by the fact that the narrow-gauge cars are lighter than the broad gauge. The narrow-gauge roads can be built for one-third less than the broad gauge. The narrow-gauge roads were built to sell somebody's goods.

Mr. Forney, of the RAILROAD GAZETTE, said he thought the best argument yet advanced by the narrow-gauge advocates was that "their roads were built to sell somebody's goods." [Laughter.]

Mr. Hudson said that the Festiniog road, in Wales, had already commenced to broaden. The rails were at first 16 lbs. to the yard and now they are 45 lbs.

On motion of Mr. Keeler the discussion was closed.

A letter was read from Mr. S. J. Hayes, Treasurer, expressing regret at absence on account of sickness.

An invitation from Mr. G. Clinton Gaidner, Superintendent Pennsylvania Railroad, to take a trip over that road on a special car from Harrisburg to Pittsburgh was, on motion, accepted and a vote of thanks tendered Mr. Gardner.

The Association then adjourned, on motion of Mr. Keeler, until 8 p. m.

THE RIDE TO THE PARK.

At 4 o'clock the delegates and their ladies took carriages provided for them at the Carrollton Hotel, and drove through Druid Hill Park. The scenery was much admired, and, as the weather was clear and delightful, the ride was a most pleasant one and seemed to be thoroughly enjoyed.

EVENING SESSION.

The convention reassembled at Raine's Hall at 8 o'clock p. m. The President appointed Mr. C. R. Peddie as member of Committee on Subjects, in place of Mr. H. L. Brown, declined.

SOLID-END CONNECTING RODS.

The next matter in order was the consideration of the report of the Committee on the Construction and Operation of Solid-end Connecting Rods for Locomotives.

The Committee stated that their individual experiences with the solid-end rod had been so limited that they would not feel justified in deciding against their use. To their inquiries replies have been received from the representatives of 25 different roads and manufacturing companies, from which the Committee find the following: Eleven have used them, but do not now, believing them more expensive and less serviceable; five have used both solid and connected with strap, but express no preference; four are using both kinds, with preference for the strap; three favor the solid end, thus showing a small minority only who favor the continuance of the solid-end rod. The Committee recommend its free discussion in the convention. The report was signed by J. Sedgely, Lake Shore & Michigan Southern; J. W. Nesbitt, Evansville, Terre Haute & Chicago, and N. E. Chapman, Cleveland & Pittsburgh. The report was received and filed, but there was no discussion.

RESISTANCE OF TRAINS.

The next in order was the report of W. A. Robinson, Great Western of Canada; William Jackson, Rome, Watertown & Ogdensburg, and C. T. Ham, late of New York Central & Hudson River; the Committee on "Resistance of trains on straight and curved tracks, and on wide and narrow gauge road, and with four and six-wheeled trucks, and with long and short wheel base." The report states that but nine replies were received from 300 circulars sent out, and they contain scanty information.

Six-wheel trucks produce greater resistance and absorb more hauling power than four-wheel trucks. The six-wheel trucks do not appear to be used except for heavy baggage, sleeping and other cars. In case of broken rails or axles, six-wheel trucks prove an advantage, but for ordinary purposes the four-wheel trucks are preferable. A reasonably long-wheel base is productive of steadier motion. No experiments have yet been made with rolling stock to determine the dynamic force or resistance in pounds per ton, hauled at various speeds, and with different classes of trucks. The report recommends experiments. It was received and filed.

The utility of the dynamometer, an instrument to measure the power required in performing work, such as the power required to draw cars, was discussed. It was stated it would not cost over \$150, but one self-registering would cost \$300. Another delegate stated it would cost from \$300 to \$500.

Mr. Robinson moved a committee be appointed on establish-

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Editorial Announcements.

Removals.—The Chicago office of the RAILROAD GAZETTE has been removed to No. 71 Jackson street, opposite Third avenue. The New York office of the RAILROAD GAZETTE is removed to Room 131, No. 73 Broadway, opposite the upper elevator landing.

Correspondence.—We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Inventions.—No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay. EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE MASTER MECHANICS' ASSOCIATION.

A report of the meetings of this Association will be found in another part of this paper. We will therefore not attempt to give here even a summary of the proceedings, but merely a few comments on what was and what was not done in Baltimore. The attendance was about the same or possibly somewhat greater than that of the year previous in Boston. The reports read were fully equal to those of last year, some of them of considerable length and evidently prepared with great care. The discussions, however, were generally of less interest than those of last year. This was owing partly to the fact that some of the reports were so long as to be tedious, the attention of the audience being exhausted before the reading was concluded. Another cause was the want of time for the proper consideration of the business presented. There were so many subjects for consideration that it was impossible to discuss any of them as their importance deserved. The sessions in Boston and Baltimore have made it very apparent that some steps must be adopted at future meetings to economize time. The committees should also aim to condense their reports as much as possible, and also to have them written legibly, as the Secretary had great difficulty in reading some of them. It matters very little how able or conclusive a report may be, if it loses much or all of its force if it cannot be read so as to be intelligible. It is surprising, too, how slight a thing will divert the attention of an audience from the subject-matter before them. A noise which prevents the speaker's or reader's voice from being understood, or any side play from those who are on the platform or the floor, will attract or divert the attention of those who are listening, so that what is read will make but little impression. The collateral circumstances attending the presentation of any subject are, therefore, deserving of more careful attention than they usually receive. The hall occupied by the convention was long, high and narrow, so that it was difficult to hear any who did not speak distinctly. From this evil the society has suffered at every meeting that it has held. The rooms have nearly always been too large for the audience, and have in some cases been subject to the noise from the streets adjoining. It is, we know, very difficult to provide against this in all cases, as the committees who have the arrangements in charge are obliged to select such rooms as they

can get, which are not always the most desirable for the purpose for which they are to be used.

The subjects discussed in the reports we will reserve for future consideration. It was to be regretted that the committees on Boiler Construction, Narrow-Gauge Roads and Tires did not report. Last year the former subject excited the most interesting discussion of the session, and one which, we believe, will result in a great improvement in that branch of locomotive construction. The report of the Committee on the Purification of Water was listened to with much interest, and was probably altogether the most valuable of them all.

If there were nothing else to indicate the work which the Association can do, the inconclusiveness of some of the reports and discussions would show very plainly what needs to be done. Take as an example the report on the comparative value of Anthracite Coal, Bituminous Coal and Wood. It might be presumed that this is a question which almost every road in the country would have been obliged to determine before this time, and which every master mechanic would have studied; and yet the Committee found it impossible to get sufficient data to justify them in making a report which would determine with any degree of accuracy or definiteness the main questions proposed. Other subjects to be reported upon present similar problems, some of which were announced, while others were left undetermined. The main object of the Association is to answer such questions as the subjects proposed for the consideration of the committees embrace; and when the convention meets for the purpose of determining how the construction of locomotive boilers can be improved, water be purified, the cost of operating train-brakes, the resistance of trains, the best form and proportion for a standard car axle, etc., and adjourns, the success of the meeting is measured exactly by the amount of information which has been elicited regarding the questions which have been presented for consideration. It is quite true that some of the questions proposed are at present incapable of solution, simply because the requisite information has not been collected; but when this is the case, the Association, if it fulfils the objects of its organization, must push its inquiries as urgently as possible. Every member should feel when he attends these meetings that he is being personally interrogated regarding the problems presented, and that he is not fulfilling the duties of membership until he can give an answer. What shall be said of a master mechanic who has the machinery of a railroad under his charge, who directs all the expenditures, and is entrusted with the lives of its passengers, who has no distinct opinions about the best methods of constructing boilers, the "efficiency of check-chains," the relative cost of fuel, or other similar and probably more important questions, and who is indifferent about all of them? It is the business of master mechanics to have opinions, and very clear ones too, on such and kindred subjects, and the Association will fulfil its objects just in proportion as it succeeds in eliciting answers to the questions propounded.

Judging it by this standard, the meeting in Baltimore, although not quite so fruitful of immediate results as its best friends may desire, has nevertheless taken some steps which promise to yield very useful results in future. Among them one of the most important is the appointment of a committee to consider the practicability of establishing a mechanical laboratory. This measure has already been discussed in these pages, and its advantages and dangers been pointed out. That it may be very fruitful of good results is, we think, very apparent; but, on the other hand, it is attended with dangers which, if not carefully guarded against, may bring great discredit upon the Association. The committee appointed to consider it is a very excellent one, and will, we believe, give the whole subject very careful consideration. The measure presents the very difficult problem of organizing a department of applied science, and of conducting its pecuniary affairs. This will involve the collection and expenditure of considerable sums of money under circumstances peculiarly liable to what are now termed "influences." That money could be expended to very great advantage in making experiments, there is very little doubt; but that very great care will be required in directing them is also equally apparent.

That the Master Mechanics' Association has an opportunity for success and usefulness which is very rarely presented is, we think, now sufficiently apparent. The future of railroads is one which few men dare predict. That we are now standing on the threshold of very great changes in their relation to the public seems not impossible. While we write comes the news that the lower House of the Massachusetts Legislature has committed itself in favor of the project of State management of a portion of its roads. Some far-seeing and intelligent thinkers are predicting that the railroad question will influence to a degree now not generally suspected all of our political institutions and possibly change their entire

character. Of course it would be mere blindness to make predictions, or to attempt to indicate the nature of the changes or the sort of control into which the railroads will then fall. We have, however, frequently called attention to the magnitude of the interests involved in the operation of the machinery departments of our great roads, and of the importance of bringing science to aid in the direction of operations which it alone can elucidate. That this will become more and more important and apparent each year, as the machinery departments increase in importance and extent, is, we believe, beyond question. Now while it might be idle to attempt to predict what from the nature of things it is impossible to know, it may not be unwise to observe what has occurred under similar circumstances in other departments of industry, under circumstances somewhat analogous to those which now exist in the management of railroads. Fortunately the excursion of the master mechanics to Annapolis furnished an opportunity of making such observations. It will be remembered by most of our readers that it is only comparatively a few years ago since steam became an important element in our navy. At first, and for a number of years after its introduction, the supply of engineers was procured from such sources as the private shops and engineering establishments could supply. It was soon found, however, that in this way a rather indifferent class of men was secured, and that it was desirable to provide a class of men especially trained for the service for which they are intended. This led to the organization of the department of steam engineering at the Naval Academy at Annapolis, which was visited by the members of the Association. A school has been established there, with appliances especially adapted to instruct the students of steam engineering in their duties. There are machines, models and drawings illustrating the construction of marine engines. A thorough system of education is also adopted, and every method which scientific knowledge and practical experience could suggest has been provided to train the students for the duties for which they are intended.

Now if the navy department find it is necessary and profitable to give the men who are to design and manage the engines in our marine service a thorough education and training for their duties, it will probably ultimately come about that those who in future will control our railroad service will give a similar training to those who are to have the care and management of railroad machinery. That some such idea is already beginning to dawn upon their minds and has been put into practice by some railroad managers it would not be hard to show. It may thus be that the apparently modest movement to organize a "mechanical laboratory" to provide the requisite apparatus to solve problems which need solution may become the nucleus of a much broader movement and the foundation of a "Railroad Academy" of the future.

Putting aside, however, speculations which may seem wild, there can be no doubt that the Master Mechanics' Association has the opportunity of becoming, and to some extent now is, an educational institution whose opportunity for usefulness is greater than that of almost any similar Association, which opportunity is much more likely to increase than diminish.

With reference to what might be called the secondary uses of the annual conventions, by which are meant the means which they afford for social intercourse and acquaintance, the meeting in Baltimore certainly fulfilled all that could be asked for in this respect. The well-known hospitality of Baltimoreans never appeared more striking than when it was found that of all those who subscribed to entertain the members of the Association, only two were peculiarly interested in doing business with railroad companies. This fact was stated in appropriate resolutions, which will be found on another page.

We are also gratified in being able to announce that certain convivial practices, which we took occasion a few weeks ago to condemn—and for the doing of which we incurred the disapproval of some of our friends, and, we fear, made enemies of others—had no existence in Baltimore, and that members of the Association can now meet with prompt denial any charge of this kind which may be made.

THE ST. CROIX LAND GRANT.

A great part, if not the greater part, of the last session of the Wisconsin Legislature was taken up in considering claims for what is known as the "St. Croix land grant," which was offered in 1856 to a company on condition that it should construct a railroad from St. Croix River or Lake to Lake Superior, and, when the company failed to complete (or begin) the work within that period, was offered for a further period of three years, with the same result. But as time passed and portions of the adjacent country were occupied, the lands became more valuable—at least more marketable—and the St. Croix &

Superior Railroad Company, or its successors, was convinced that the grant might be made profitable. Thereupon application was made to Congress at two successive sessions to renew the lapsed grant; but, though there was an influential lobby to press the measure, and it is hinted that "solid arguments" abounded in Washington in favor of it, it was signally defeated, and the temper of the people has been so generally manifested as opposed to further land grants of any kind that no hopes remained of securing the land from that source.

But meanwhile the United States Circuit Court for Minnesota in June last delivered a decision (in a matter concerning trespasses by individuals on government lands, we believe), in which it held that the title to these lands is in the State of Wisconsin, until otherwise determined, either by a decree of the Court or by an act of Congress. This was a surprise. It was almost universally supposed that when the grant lapsed, the land became at once the property of the granting power, that is, the general government. But it opened a new way to the acquisition of the lands, for not only might the Wisconsin Legislature be more open to argument than the United States Congress, but it would have the general support of the State in disposing of the grant for State improvements, when otherwise it was likely to be resumed by act of Congress for the use of the whole United States. So, the grant in the sixteen years since it was first offered having very largely increased in value, plenty of bidders for it appeared at the session of the Wisconsin Legislature last winter. Companies with capital and companies without, delegates from the district in which the grant is situated and delegates from almost every other part of the State, had some scheme for the disposal of the lands for the special use or benefit of their corporation or district. The competition had its usual effect, and the State was able to set even responsible parties bidding against each other, so as to utilize to the utmost the value of the grant to the State. The two great corporations of the State were the most prominent competitors, and of these the Milwaukee & St. Paul worked directly for itself, while the Chicago & Northwestern supported the North Wisconsin Company, which was, in the individuals composing it, virtually the same as the West Wisconsin, with which the Northwestern has close relations.

Under the stress of competition and the pressure of different districts to secure accommodations for themselves, line after line was added to the original route for which the land was granted, until at last the Milwaukee & St. Paul agreed to construct three railroads instead of one, with an aggregate mileage about twice as great as that of the old St. Croix & Superior Railroad. Other offers nearly equaled this, but the Legislature finally passed a bill which virtually accepted the offer of the Milwaukee & St. Paul Company, which was to signify its formal acceptance of the grant and the terms proposed by the 15th of May.

As the company had kept at the capital nearly throughout the session a considerable force of the ablest, shrewdest and most influential agents, had labored with extraordinary energy and skill, and made no inconsiderable expenditures to secure the passage of the act making this grant, it may be supposed that when on the 15th inst. it signified to the Governor of the State that it would not accept the grant there was all over Wisconsin a general outburst of astonishment and indignation.

The communication of the President of the company to the Governor of the State, in which the grant was refused, assigns as reasons for the refusal, briefly:

That by the terms of the act of Congress, granting the lands, they have reverted to the United States.

That the decision of the United States Circuit Court, holding that the lands are at the disposal of the State of Wisconsin, is not final, and has, in fact, been appealed from to the United States Supreme Court, where it is now pending.

That there is unofficial information to the effect that both the Secretary of the Interior and the Attorney-General hold that the title to the lands is now in the United States, which, if true, would doubtless prevent the execution of a transfer to the company, in case they should complete the road as required by the act of the Legislature, unless meanwhile the Supreme Court should have affirmed the decision of the court below.

And finally, that, with so great a doubt resting upon the title, it would not be possible to obtain the money necessary for the construction of the roads.

These are certainly good and sufficient reasons for not accepting the act; but they by no means satisfy the press and people of Wisconsin, who say with much force that they should have been good and sufficient reasons for not seeking it with so much apparent eagerness and earnestness last winter. Mr. Mitchell's letter says that the company "labored in good faith" for the grant, and mentions, apparently as an explanation of these misapprehensions, that "these views of the Secretary of the Interior

RAILROAD EARNINGS FOR APRIL, 1873.

NAME OF ROAD.	Mileage.		Increase.		Earnings.		Inc.	Dec.	Per cent.	Earnings per mile.	
	1873.	1872.	Miles.	P. c.	1873.	1872.				1873.	1872.
Atlantic & Great Western.....	539	506	33	6%	\$434,845	\$393,234	\$41,611		10%	\$807	\$777
Atlantic & Pacific.....	328	328			105,352	87,543	17,809		20%	321	267
Burlington, Cedar Rapids & Minnesota.....	334	261	73	28	77,387	61,881	15,506		25%	232	237
Central Pacific.....	1,218	1,094	124	11%	1,133,920	949,598	183,322		19%	931	868
Chicago & Alton.....	649	614	35	5	412,218	374,878	37,340		10	635	607
Chicago & Northwestern.....	1,404	1,353	51	3%	990,816	960,375	30,441		3	706	665
Cleveland, Columbus, Cin. & Indianapolis.....	470	390	80	20	432,928	381,113	51,815		13%	921	977
Columbus & Hocking Valley.....	89	89			93,139	66,500	26,639		40%	1,066	744
Erie.....	971	956	15	1%	1,541,958	1,287,993	253,965		19%	1,588	1,328
Illinois Central.....	1,109	1,109			544,035	559,871	-15,836		-3%	491	505
Indianapolis, Bloomington & Western.....	212	212			124,051	114,851	9,200		8	585	542
Kansas Pacific.....	672	672			352,200	320,534	31,666		9%	521	477
Lake Shore & Michigan Southern.....	1,136	998	138	13%	1,694,543	1,528,250	166,293		10%	1,491	1,331
Marquette & Cincinnati.....	281	281			190,562	145,858	44,704		30%	671	514
Michigan Central.....	715	715			675,849	607,678	68,171		11%	945	850
Milwaukee & St. Paul.....	1,330	1,121	209	18%	569,826	474,188	95,638		20%	430	360
Missouri, Kansas & Texas.....	741	516	225	44%	261,700	117,548	144,152		122%	354	228
Ohio & Mississippi.....	393	393			383,236	273,920	109,316		31%	946	697
Pacific of Missouri.....	471	385	86	22%	320,991	295,160	25,831		8%	682	633
St. Louis, Alton & Terre Haute, Main Line.....	266	266			113,632	115,517	-1,885		-1%	427	434
St. Louis & Iron Mountain.....	285	221	64	27%	208,140	178,666	29,474		16%	720	708
St. Louis, Kansas City & Northern.....	583	583			231,866	230,109	1,757		0%	398	395
St. Louis & Southeastern, St. Louis Div.....	304	304			59,241	31,241	28,000		53	296	193
Toledo, Wabash & Western.....	128	928			446,527	447,313	-786		0%	711	711
Central, of New Jersey.....	291	291			725,083	651,325	73,758		11%	2,492	2,238
Total.....	15,127	14,165	962	6%	\$12,073,332	\$10,845,538	\$1,227,794		11%	\$798	\$766
Total increase.....											

RAILROAD EARNINGS, FOUR MONTHS ENDING APRIL 30.

NAME OF ROAD.	Mileage.		Increase.		Earnings.		Increase.	Decrease.	Per cent.	Earnings per Mile.				
	1873.	1872.	Miles.	P. c.	1873.	1872.				1873.	1872.	Inc.	Dec.	P. c.
Atlantic & Great Western.....	539	506	33	6%	\$1,590,567	\$1,462,683	\$127,884		8%	\$2,951	\$2,891	\$60		2%
Atlantic & Pacific.....	328	328			402,173	326,863	75,310		19%	1,226	1,027	199		19%
Burlington, Cedar Rap & Minn.....	334	261	73	28	302,657	269,090	33,567		12%	906	1,031	-125		-12%
Central Pacific.....	1,218	1,094	124	11%	3,654,255	2,989,420	664,835		22%	3,000	2,733	267		9%
Chicago & Alton.....	649	614	35	5	1,376,790	1,132,705	244,085		21%	2,130	1,809	321		18%
Chicago & Northwestern.....	1,404	1,353	51	3%	3,468,443	3,246,445	221,998		7%	2,490	2,437	53		2%
Cleveland, Columbus, Cin. & Indianapolis.....	470	390	80	20	1,665,906	1,414,900	251,006		17%	3,544	3,025	519		17%
Erie.....	971	956	15	1%	5,704,593	5,619,548	84,045		1%	5,874	5,878	-4		0%
Illinois Central.....	1,109	1,109			2,339,435	2,304,320	35,115		1%	2,109	2,078	31		1%
Kansas Pacific.....	672	672			994,552	929,372	65,180		7%	1,486	1,480	6		0%
Lake Shore & Mich. Southern.....	1,136	998	138	13%	6,567,519	5,660,758	906,761		16%	5,781	5,672	109		1%
Marquette & Cincinnati.....	281	281			701,637	591,627	110,010		19%	2,478	2,083	395		19%
Michigan Central.....	715	715			2,393,762	2,155,820	237,942		10%	3,334	3,015	319		10%
Milwaukee & St. Paul.....	1,330	1,121	209	18%	1,892,674	1,748,968	143,706		8%	1,425	1,274	151		12%
Missouri, Kansas & Texas.....	741	516	225	44%	932,739	385,632	547,107		144%	1,277	747	530		71%
Ohio & Mississippi.....	393	393			1,324,663	1,071,776	252,887		24%	3,417	2,977	440		15%
Pacific of Missouri.....	471	385	86	22%	1,154,867	1,107,173	47,694		4%	2,456	2,119	337		16%
St. Louis, Alton & Terre Haute, main line.....	266	266			463,724	464,729	-1,005		0%	1,743	1,747	-4		0%
St. Louis & Iron Mountain.....	285	221	64	27%	788,668	690,721	97,947		14%	2,793	2,084	709		34%
St. Louis, Kansas City & Northern.....	583	583			871,978	930,190	-58,212		-6%	1,496	1,596	-100		-6%
St. Louis & Southeastern, St. Louis Div.....	304	304			1,693,226	1,779,658	-86,432		-4%	5,566	5,834	-268		-4%
Toledo, Wabash & Western.....	128	928			427,382	423,184	4,198		0%	2,016	2,006	10		0%
Central, of New Jersey.....	291	291			2,527,953	2,134,708	393,245		18%	8,657	7,316	1,341		18%
Total.....	14,738	13,731	1,007	7%	\$11,374,983	\$9,927,607	\$1,447,376		14%	\$2,936	\$2,857	\$79		3%
Total increase.....														

and the Attorney-General, and the fact that an appeal had been taken in these cases, were not known till after the adjournment of the Legislature." It appears, however, that in Governor Washburn's message the fact of the appeal was mentioned, and it seems extraordinary that it could have escaped the notice of the company.

It is therefore generally assumed that the letter does not cover the Company's real reasons, at least not all of them, for its action. A correspondent of the Milwaukee News says:

"The reasons for declining to accept the grant are:
"First—That no money can be had to put into railroad building at the West, in consequence of the great excitement and hostility to railroad management among the people.

"Second—Gov. Washburn's refusal to issue certificates as required by the terms of the grant to the Wisconsin Central and his acknowledged hostility to the St. Paul Company lead to the belief that he would embarrass and cripple their operations in all imaginable ways.

"Third—The company's legal advisers regard as very improbable that the State will ever get the lands to transfer to the company.

"These reasons are not, of course, all stated in the official communication of the directors to the Governor, but they are well understood.

More generally the press assume that company never intended to accept the grant, but purposely outbid its competitors, and made offers that no one could afford to fulfil, simply to prevent the construction of any road by a rival company.

If the proposed St. Croix & Superior road were a natural part and extension of the Milwaukee & St. Paul's lines, this would be easily intelligible, if not defensible, conduct. But this is not at all the case. The projects of the other companies, if profitable to themselves (of which there is a great deal of doubt), would scarcely have affected the traffic of the Milwaukee & St. Paul at all; and there could hardly be room for jealousy, unless it were jealousy of any degree of prosperity in any other corporation.

Of course the arguments advanced by the Milwaukee & St. Paul Company would be equally applicable to any other competitor for the grant. Scarcely one of the roads proposed could be expected to be sustained by its traffic for many years to come, and to have a line begun, and then abandoned by the failure to secure the land grant, would be a misfortune to State and its credit as well as to the corporation. The Milwaukee & St. Paul announces its willingness to accept the grant "if the title of the State to these lands should be confirmed," "a reasonable time being allowed to complete the road." The company certainly

should have assurance that the State owns what it offers before it gives anything for it; and, whatever terms it may have felt able to offer during the session of the Legislature, it would hardly be bound by them now if it has been definitely ascertained that money positively cannot be obtained to build the proposed roads so rapidly, which is very probable. There are many companies which last winter fully expected and intended to raise money in large amounts for new works which now find it impossible to borrow a dollar. Germany and Holland, where the Milwaukee & St. Paul and the Chicago & Northwestern have heretofore been able to borrow money pretty easily, are now very much disinclined to touch American railroad securities, and it may be quite impossible to do now what was done readily last year. It is a common error, in the West especially, to suppose that a "great railroad company" has uncounted wealth in its treasury and can build railroads at will, without reference to their prospective profitability. But the fact is that every company depends almost entirely upon its borrowing power for making new extensions, and though a strong company may be able to borrow easily upon its old property, and can easily get the attention of lenders for a new one, it is the prospective value of the new one, and the consequent security for the loan, which finally decides the feasibility of borrowing for a new enterprise. For some years past neither the Milwaukee & St. Paul nor the Chicago & Northwestern has had any great surplus, over dividends, to invest in new lines; and neither of them would be likely, at this time at least, to succeed in placing a loan on an uncertain or insufficient security, such as the St. Croix land grant appears to be.

The Railway Association of America.

The late meeting of this Association in New York (on Wednesday and Thursday of last week) cannot be said to have been very successful. The chief fault was the absence of members. Several reports were presented; but most of these were from committees whose members were not present to present, call up and discuss their reports; and there was apparently little disposition to criticize, or at least to take action on, papers whose authors were not present. Small as the attendance was, it was sufficient to debate effectively, even if it could not well decide questions finally; and the lack of discussion is to be regretted.

We publish this week all the committee reports except that on train dispatching, which we hope to find room for next week.

The report on postal cars gives some information but recommends no immediate action; that on a standard national time simply diminishes the subject as one on which action is not now expedient; that on the gauge of compromise cars recommends that the distance between the points on compromise car-wheel flanges which come in contact with the sides of the rail-heads should be 4 ft. 8 in., and simply confirms the recognized rule, which, however, is not sufficiently known and observed; that on train dispatching opens the subject and promises further treatment, and perhaps definite recommendations, at a future meeting; that on the interchange of cars made definite recommendations, which looked toward a reform, but were not thought sufficiently radical by the members present, who referred the subject to a new committee.

On this last subject there was some real discussion and a manifestation of decided interest, and, we may say, the ability to do well the work for which the Association is designed. The expression was unanimous as to the great loss occasioned by delays in returning freight cars interchanged, and the utter inefficiency of the present system of charges in inducing companies to make reasonable efforts to keep foreign cars moving toward a return. Mr. McMullin, of the Chicago & Alton, believed that the present system is radically wrong, and that the proper charge should be on the basis of the time a car is absent, instead of the mileage it makes while absent, and there seemed a very general disposition to agree with him, though the discussion was but slight.

One of the features of the meeting which attracted most attention outside of it was the conference with a delegation of the Brotherhood of Locomotive Engineers. The Brotherhood has felt that its position might be misunderstood and a strong and undeserved prejudice against it created by the action of one of its branches, or the members of that branch, on the St. Louis, Kansas City & Northern Railway recently. It is extremely anxious to maintain a good name with railroad officers, and its officers seem very much hurt by the rash and foolish action of the men in Missouri. So Mr. Charles Wilson, the chief officer of the society, explained very much in detail the organization, aims and rules of the Brotherhood, endeavoring to show that its chief design is to improve the character and efficiency of its members, and that its regulations concerning strikes are such as, if observed, would absolutely prevent any thoughtless and sudden action. In this endeavor he succeeded very well indeed, and his presence and manner as well as his words made a very strong impression in favor of his entire sincerity and devotion to worthy ends in his direction of the organization over which he presides.

It is a noticeable fact—and more or less deplorable—that but few officers of Eastern roads were present. It is, however, not true that none are members of the Association. Several are, and, we may say, there are many evidences that men who were not present take a lively interest in its affairs, and, to some extent, are ready to work for it. But the tree must ultimately be judged by its fruit; and, to attain anything like a success worthy of it, the Association must hereafter have more work from its members in giving information for and preparing reports, and a better attendance and more discussion at its meetings.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE has information of the laying of track on new railroads as follows:

Wilmington, Charlotte & Rutherford—Eastern Division.—Extended from Lisleville westward 4 miles to a point within two miles of Wadesboro, N. C. Davenport & St. Paul.—Extended from Strawberry Point northwestward 19 miles to Fayette, Iowa.

This is a total of 23 miles of new railroad.

Annual Conventions.

The following societies will hold their annual conventions at the time and places named:

The Master Car Builders' Association, on the 11th, 12th and 13th of June, in Boston.

STATE MANAGEMENT, on the plan proposed by Mr. Charles Francis Adams, Jr., of the Board of Railroad Commissioners, seems likely to be tried in Massachusetts, as the lower house of the Legislature has voted by 133 to 90 to substitute for the majority report of its committee on consolidating the lines which form the "Tunnel Route" the minority report which favors the working of this line by the State. The Senate is understood to be largely in favor of this policy, and unless the Governor should interpose his veto, it seems probable that this interesting experiment will be tried.

Colonel Anderson, late Superintendent of the Illinois Division of the Toledo, Wabash & Western road, was recently presented by the employees of the road with a handsome watch and chain and an elegant silver service.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—At the annual meeting of the Louisiana & Missouri River Railroad Company, in Louisiana, Mo., May 5, the following board of directors was elected: David Landon, Saline County, Mo.; Thomas Shackelford, R. T. Prewitt, Howard County, Mo.; Robert B. Price, Boone County, Mo.; Charles H. Hardin, Audrain County, Mo.; Wm. King, Callaway County, Mo.; H. V. P. Block, Pike County, Mo.; J. J. Mitchell, Robert P. Tansey, St. Louis. The board organized by electing H. V. P. Block, President; Thomas Shackelford, Vice-President; Judge Fagg, Attorney; Major Draper, Secretary, Auditor and Treasurer.

—The newly elected board of directors of the New Jersey Midland Railroad Company has chosen C. A. Wortendyke, President; John Loomis, Vice-President; Henry R. Low, Treasurer, and H. Watkins, Secretary.

—At the annual meeting of the Detroit & Bay City Railroad Company, at Rochester, Mich., May 14, the following were elected directors for the ensuing year: L. Woodward, E. H. Wilcox, Rochester, Mich.; A. H. Hart, Lansing, Mich.; James F. Joy, Detroit; H. H. Smith, Jackson, Mich.; F. North, Vassar, Mich.; C. C. Fitzhugh, Bay City, Mich.; H. H. Hunnewell, N. Thayer, W. F. Weld and Isaac Livermore, Boston, Mass.

—Mr. C. J. Mack, late of the Indianapolis & St. Louis road, has been appointed Superintendent of the Paris & Decatur road, in place of Mr. F. C. Stratton, who has resigned.

—At the annual meeting of the Charters Railway Company, May 3, the following officers were elected: President, George B. Roberts, Philadelphia; directors, J. Edgar Thomson, Josiah Bacon, W. J. Howard, B. Wistar Morris, Strickland Kneass, Philadelphia; William K. Nimick, Pittsburgh, Pa.

—The officers of the Richmond & Chesapeake Railroad Company, organized at Richmond, Va., May 3, as successor to the Richmond & York River Company, are as follows: President, R. S. Burrows; Vice-President, Thomas Clyde; Secretary and Treasurer, W. E. Smith; directors, R. S. Burrows, Thomas Clyde, W. G. Hoyt, Dr. W. H. Gwathey, W. W. Gordon, Reuben Foster.

—At the annual meeting of the Claremont & White River Junction Railroad Company at Cornish Flat, N. H., May 7, the old board of directors was re-elected. H. W. Parker was chosen President, T. A. Gleason, Treasurer, and G. W. Hunt, Clerk.

—At the annual meeting of the Cheshire Railroad Company, at Keene, N. H., May 14, the following board of directors was chosen: Thomas M. Edwards, John H. Elliot, Isaac M. Murdoch, Winchendon, Mass.; W. A. Bingham, George F. Williams, Boston. Mr. Williams takes the place of C. W. Cartwright, of Boston, who declined re-election.

—The recently elected board of managers of the Delaware & Hudson Canal Company has elected the following officers: President, Thomas Dickson; Treasurer, James C. Hartt; Secretary, George L. Haigh.

—Mr. George Bachelder has been appointed General Agent in Portland, Me., for the Eastern Railroad. Mr. Bachelder has been in the employ of the Eastern Railroad Company for 20 years, much of the time as conductor.

—At the annual meeting of the Joliet & Chicago Railroad Company in Chicago, May 14, the old board of directors was re-elected, as follows: John Orer, T. B. Blackstone, John B. Drake, J. McGregor Adams, of Chicago, and D. Willis James, of New York. The company's road is worked by the Chicago & Alton.

—The stockholders of the Monticello & Georgia Railroad met at Monticello, Fla., May 2, and organized the company by the election of the following board of directors: A. B. Gruenell, J. W. Johnson, W. R. Long, A. H. McCann, T. M. Palmer, S. Pasco and S. Simkins. The directors elected S. Pasco, President, and A. B. Gruenell, Secretary.

The Indianapolis News says that Mr. A. E. Shrader has resigned his position as General Freight Agent of the Evansville & Crawfordville Railroad, to accept a similar position on the St. Louis & Southeastern.

—At the annual meeting of the Sioux City & St. Paul Railroad Company, in Sioux City, Iowa, May 5, the following board of directors was elected: E. F. Drake, H. Thompson, A. H. Wilder, J. L. Merriam, St. Paul, Minn.; A. H. Rice, G. H. Mackay, Boston; Adrian Iselin, George J. Seney, New York; B. M. Goldschmidt, Frankfurt, Germany. Mr. Merriam is the only new member of the board, taking the place of S. T. Davis, of Sioux City.

TRAFFIC AND EARNINGS.

—The earnings of the St. Louis & Southeastern Railway (consolidated) for the second week in May were \$25,490.16. The earnings of the St. Louis Division for the week were: 1873, \$15,085.48; 1872, \$8,009.40; increase, \$7,076.08, or 88½ per cent.

—The earnings of the Flint & Pere Marquette Railroad for the year 1872 were as follows:

Gross earnings (\$5.200 per mile).....	\$1,133,612
Operating expenses (59½ per cent.).....	678,494
Net earnings (\$2.038 per mile).....	\$455,118
Receipts from land sales.....	\$19,550
	\$774,663

—The earnings of the Camden & Atlantic Railroad for the year 1872 were as follows:

Gross earnings (\$7.297 per mile).....	\$467,036
Expenses (54½ per cent.).....	254,917
Net earnings (\$2.314 per mile).....	\$212,119

—The following is a statement of the receipts and expenses of the Central Railroad of New Jersey for the four months ending April 30:

Receipts.....	1873.	1872.	Increase.	Per cent.
\$2,527,952 84	\$2,134,768 01	\$393,184 81	18½	
Expenses.....	1,365,294 52	1,354,863 96	10,430 56	0¾

Net earnings...\$1,162,658 32 \$779,901 07 \$382,757 25 49½
For 1873 the expenses are 54 per cent. of receipts, and for 1872 63½ per cent. The gross earnings are \$8,687 per mile in 1873 against \$7,336 per mile in 1872.

—The earnings and expenses of the Panama Railroad for the year 1872 were as follows:

Earnings (\$37.569 per mile).....	\$1,781,690 00
Operating expenses (37½ per cent.).....	456,077 62
Net earnings (\$35.950 per mile).....	\$1,325,612 38

The road is 47½ miles long, from Aspinwall to Panama. The very low percentage of working expenses will not seem so remarkable when it is known that the fare for the 47½ miles is \$25 gold.

—The earnings of the St. Louis & Southeastern Railway (consolidated) for the first week in May were \$26,171.01. The earnings of the St. Louis Division for the week were: 1873, \$16,586.90; 1872, \$9,614.12; increase, \$6,972.78, or 72½ per cent.

—The earnings of the Kansas Pacific Railway for the first week in May were: From passengers, \$36,710.25; freight, \$42,866.33; mails, \$2,055.31; total, \$81,631.89. Of this amount,

\$2,657.77 was for transportation of troops, mails and government freight.

—The earnings for the Milwaukee & St. Paul Railway for the second week in May were: 1873, \$156,042; 1872, \$103,278; increase, \$52,764, or 51½ per cent.

—The earnings of the St. Louis & Southeastern Railway (consolidated) for the month of April were \$103,388.46, or \$290 per mile. The earnings of the St. Louis Division for the month were: 1873, \$59,995.45; 1872, \$39,240.98; increase, \$20,754.47, or 53 per cent.

—The earnings of the Grand Trunk Railway of Canada for the week ending April 26 were: 1873, \$38,600; 1872, \$35,900; increase, \$2,700, or 7½ per cent.

—The earnings of the Great Western Railway of Canada for the week ending April 25 were: 1873, \$27,236; 1872, \$25,696; decrease, \$1,540, or 6 per cent.

—The earnings of the Erie Railway for the week ending May 7 were: 1873, \$387,148; 1872, \$412,445; decrease, \$25,297, or 6½ per cent.

—The earnings of the Kansas Pacific Railway for the fourth week in April were: from passengers, \$32,265.68; freight, \$55,679.08; mails, \$2,055.32; total, \$90,000.08. Of this amount, \$4,473.37 was for transportation of troops, mails and government freight.

CHICAGO RAILROAD NEWS.

Michigan Central.

This company has just equipped their fast day express trains throughout with new cars fitted up and furnished in the most elegant style.

The late rains have so raised the streams throughout Michigan as to float down to the mills all the logs which have been waiting, in many cases, for two years, to be moved to the vicinity of the lake shore. The chief result of this is that lumber promises to be very cheap in Chicago for the present season. This state of things will probably have the effect of preventing the completion of the Jackson, Lansing & Saginaw Division of the Michigan Central road this Summer beyond Otsego Lake. At last it is very doubtful whether the road will be completed to the Straits this Summer, as was a few months since designed.

Chicago, Burlington & Quincy.

On Sunday afternoon, May 18, a fire broke out in the paint shop of this company at Aurora, resulting in the total destruction of the large paint shop, wood-working shop, carpenter shop and car blacksmith shop, all wooden buildings but very large and filled with the best machinery. In the paint shop two new Pullman cars were destroyed, and another one outside which was not standing upon trucks. Five passenger cars, three new freight and two mail cars are also reported to have been destroyed. The machinery destroyed was very valuable, but the greatest loss doubtless was the large amount of valuable seasoned lumber destroyed. The fire-proof buildings, including the round house, the larger blacksmith shop and the foundry, were not destroyed. The fire has not affected the business of the company in the least, and it is the intention of the officers to reconstruct the destroyed buildings as soon as possible in a more permanent form. The property destroyed was worth about \$250,000, which is fully covered by insurance.

The New Non-Discriminating Freight Rates.

The general freight agents of all the great roads centering in Chicago are figuring upon a freight tariff which shall comply with the new railroad law and yet yield a sufficient revenue to the several railroad companies. The undertaking is found to be a very difficult one. The Chicago & Northwestern, the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy roads form a class by themselves, where there are few competing points, and where, therefore, the difficulties are not so great. The Chicago & Alton and the Illinois Central have the greatest difficulties to contend with in making the new tariff, and it is probable that these lines will be obliged practically to abandon business at points competing with the east-and-west lines. It has been held by the law officers of the several roads interested that the law only applies to local freight, that is, to freight originating in Illinois, and does not apply at all to through freights which start at points outside of this State. The Chicago, Burlington & Quincy road expect to lose a great share of the business between Quincy and Chicago. The Illinois Central will lose the business at Mattoon, Tolono, and other east-and-west crossings. The Chicago & Alton will lose the Bloomington trade, etc. It is estimated that the new rates between Chicago and Quincy will be from 25 to 30 per cent. higher than before, while the local rates along the line will be about the same as now. The same thing will hold upon the other roads, the necessities of the companies will require the maintenance of the present local rates, while rates at competing points must be so much raised, in fact, as to result simply in the loss of the business. As it appears at present, therefore, the people are not to have any lower rates than before, except in a very few exceptional cases. The effect, however, upon Chicago will be the loss of a very large business, which it could only obtain through special competing rates between this city and southern and southwestern points. It is needless to say that many of the best business men of this city—wholesale merchants—are among the most earnest defenders of the present discriminating policy of the railroad companies.

PERSONAL.

—The Buffalo Commercial Advertiser, of May 15, announces that Mr. James Tillinghast has finally declined the position of Managing Director of the Buffalo, New York & Philadelphia Railroad Company, and has decided to retain his present position as General Superintendent of the New York Central & Hudson River road.

—Mr. John H. Converse has become a member of the firm of Burnham, Parry, Williams & Co., proprietors of the Baldwin Locomotive Works. Mr. Converse was formerly Mr. E. H. Williams' confidential clerk when the latter was General Superintendent of the Pennsylvania Railroad, and went with him to the Baldwin Locomotive Works, where he has had an important position of trust.

OLD AND NEW ROADS.

New York Central & Hudson River.

The Chief Engineer has awarded contracts as follows, for the work on the additional tracks from Albany to Buffalo:

Section No. 1, from Albany to the Center, to Stephen V. Trull, of Cohoes; section No. 2, from the Center to Schenectady, to Holler & McNary, of Albany; sections Nos. 3, 4 and 5, from Schenectady to Fort Plain, to N. H. Decker, of New York; section No. 6, from Fort Plain to Little Falls, to A. M. Peck, of Albany; section No. 7, from Little Falls to Herkimer, to Hoblitzell, Champlain & Co., of New York; section No. 8, from Herkimer to Utica, to Charles Nichols, of Syracuse; section No. 9, from Utica to Rome, to Nicholas & Candee, of Syracuse; section No. 10, from Rome to Oneida, to G. H. Thompson, of Rochester; section No. 11, from Oneida to Canaseraga, to L. M. Hans, of Albion; section No. 12, from Canaseraga to De Witt, to Page & Williams, of Little Falls; section No. 13, from De Witt to Geddes (Syracuse), to Belden, Dennison & Co., of Syra-

cuse; sections Nos. 14 and 15, to John Hunter & Co., of Sterling Valley; Seneca River bridge, to Lord, Bellows & Co., of Rochester; section No. 18, to A. Marcius, of Fairport; section No. 19, to G. W. Phelps, of Rochester; section No. 20, to A. Marcius, of Fairport; section No. 21, to Larbott & Cragie, of Buffalo; section No. 22, to Bradley & Canfield, of Phelps.

The "Boesel Railroad Law" in Ohio.

In the case of Kautner against the trustees of Douchonquet township, the Supreme Court of Ohio has pronounced the "Boesel law" unconstitutional, on the ground that the General Assembly has no power to do indirectly that which the Constitution of the State prohibits it from doing directly. The Constitution of Ohio prohibits the General Assembly from authorizing any county, city or town to become a stockholder in any corporation or to raise money for or loan its credit to or in aid of any such corporation. The law in question sought to evade this provision by authorizing counties or towns to build railroads through their own territory and then lease them to corporations to be operated.

This decision will affect nearly all the new roads now under construction or projected in Ohio. A very large amount has been voted under the law, and a number of roads are being constructed under it.

Broad Ford & Mount Pleasant.

The Supreme Court of Pennsylvania has granted a preliminary injunction prohibiting any interference with the rights of the Pittsburgh, Washington & Baltimore Company pending the trial of the suit between the companies. Under this injunction a force of men has been put at work to repair the connection between the Pittsburgh, Washington & Baltimore and the Broad Ford roads, which was destroyed some weeks ago.

Lehigh & Eastern.

Col. S. C. Snymsker, Chief Engineer, has commenced the surveys for this road. The line is to be run from Hazleton, Pa., northeast to Port Jervis, N. Y., a distance of about 90 miles.

Chicago, Rock Island & Pacific.

This company is laying a second track on its road from Rock Island, Ill., east to Colona, 12 miles. It is preparing to construct a branch a few miles long from a point south of Chicago to South Chicago.

New Jersey Railroad.

Two parties are in the field surveying the line for this road. The parties commenced at Waverly, just south of Newark, and are working south through Elizabeth toward Millstone. It is said that the work of construction will be commenced as soon as the line can be located.

Wilmington, Charlotte & Rutherford.

The extension of the Eastern Division is completed to a point about two miles east of Wadesboro, N. C., and about four miles beyond Lislefield, the late terminus.

Davenport & St. Paul.

The St. Paul Press reports that this road was completed to Fayette, Ia., May 12. Fayette is 19 miles northwest of Strawberry Point, the winter terminus, and 130 miles from Davenport.

Northern Central.

The committee of stockholders appointed at the late annual meeting have reported in favor of the lease to the Pennsylvania Railroad Company. No particulars of the report are given in the dispatch announcing the fact.

Milwaukee & St. Paul.

This company has refused to accept the St. Croix land grant under the act passed two months ago by the Wisconsin Legislature. The reason given for declining the grant is the uncertainty of the title of the State thereon. So much doubt rests upon the title, it is alleged, that it would be difficult, if not impossible, for the company to obtain the necessary means for the construction of the roads called for.

Syracuse & Chenango Valley.

A meeting of the creditors of this company was to have been held in Syracuse, N. Y., May 20, to prove their debts and choose one or more assignees. The schedule of indebtedness shows that besides the first mortgage bonds issued by the company and amounting to \$500,000, there are certificates of indebtedness amounting to \$400,000, and a floating indebtedness of \$5,712.

New York & Oswego Midland—New Jersey Division.

A new track is being laid from Bloomingdale, N. J., three miles above Pompton Junction, to connect with the Mountclair Division at Riverdale, about one mile south of Pompton Junction. This track, which is about three miles long, is nearly completed.

The car repair shops have been removed from Wortendyke up the road to Pompton, where the company intends to erect extensive buildings.

Iowa Pacific.

The sale of this road did not take place April 29, as advertised, the claims against the company having been settled.

Atco & Camden.

A railroad is proposed to extend from Atco, N. J., through Blackwoodtown to Camden, a distance of about 20 miles. Atco is the junction of the Camden & Atlantic road and the Atco Spur of the New Jersey Southern. It is understood that the latter company is willing to extend its track from Atco to Blackwoodtown if the people of that village will subscribe a certain amount.

Union Pacific.

The report of the Land Commissioner gives the sales of land during the month of April as 11,471.36 acres for \$54,446.70, being an average price of \$4.92 per acre. The total sales up to May 1, 1873, were 714,908.86 acres for \$3,064,877.01, being an average price of \$4.287 per acre. The whole land grant of the company is about 12,000,000 acres.

Schenectady & Susquehanna.

It is stated that the Delaware & Hudson Canal Company has offered to take this road at an annual rental of \$28,000, but that the offer has not been accepted. The road extends from Schenectady, N. Y., southwest to Quaker street on the Albany & Susquehanna, and is 14 miles long.

Worcester & Shrewsbury.

The contract for the first section of this narrow-gauge road from Washington Square, in Worcester, to Lake Quinsigamond has been let to Leach & Wellington, of Oxford, Mass. The contractors agree to complete the road ready for the cars by July 4 for \$26,000, taking \$2,000 in stock.

Central of New Jersey and Delaware, Lackawanna & Western.

The difficulties which have for some time existed between these companies have been amicably settled. The agreement for consolidation is canceled and mutual releases executed. All the suits pending are to be withdrawn, each party paying its own costs. The Central is to transport from Hampton Junction to Elizabethport, 600,000 tons of coal yearly, for five years, for the Delaware, Lackawanna & Western at a fixed

price, which has been mutually agreed upon. This ends what at one time promised to be a long and stubbornly contested legal fight, by a compromise in which, apparently, the advantages are mainly on the side of the Central.

Meetings.

The annual meeting of the Rome, Watertown & Ogdensburg Railroad company will be held in Watertown, N. Y., June 4.

THE MASTER MECHANICS' ASSOCIATION.

[CONTINUED FROM PAGE 209.]

ment of a mechanical laboratory, and that this question be referred to that committee. Adopted.

The Chair appointed W. A. Robinson, of the Great Western Railway; R. Wells, of Jeffersonville, Madison & Indianapolis, and J. M. Boon, of Pittsburgh, Fort Wayne & Chicago.

CHECK CHAINS.

The report of R. Wells, Jeffersonville, Madison & Indianapolis; C. R. Peddle, St. Louis, Vandalia, Terre Haute & Indianapolis, and J. L. White, Evansville & Crawfordsville, Committee on "the efficiency of check or safety chains on engine, tender and car trucks in lessening the danger resulting from running off the track," was received. The circular issued by the Committee was first read.

The Committee report in favor of such chains, providing they be made reliable and strong. The report was very lengthy, and elaborately discussed the whole subject, and the different points presented by them were ably debated.

Mr. Gorman moved that it is the sense of the convention that safety chains be annexed to all trucks of all engines, tenders and cars, which was adopted unanimously.

The report of J. W. Philbrick, Maine Central; J. N. Foss, Vermont Central, and E. Studley, late of Concord, on "the machinery for removing snow from the track," was next in order, but the reading was deferred until Thursday morning, owing to certain drawings not being on hand.

On motion of Mr. B. W. Healy, Rhode Island Locomotive Works, Providence, R. I., the chair appointed that gentleman, J. J. Kinzey, Lehigh Valley Railroad, and W. B. Smith, South Carolina Railroad, committee to select place of next meeting. At five minutes of ten o'clock, the committee took a recess of five minutes.

On reassembling the following committee was appointed to confer with Mr. Gardner, regarding the special train from Harrisburg to Pittsburgh tendered by him: Messrs. S. Keeler, Flint & Pere Marquette Railroad; L. S. Young, Cleveland, Columbus, Cincinnati & Indianapolis Railroad, and J. L. White, Evansville & Crawfordsville Railroad.

Mr. Wells offered an additional section of article 5 of constitution, providing that no communications except those relative to the business of the convention be considered. It was adopted unanimously.

Messrs. H. M. Britton, White Water Valley; N. E. Chapman, Cleveland & Pittsburgh, and J. H. Setchel, Little Miami, the Committee on Printing, presented report. The report states the fact of printing five hundred annual reports and circulars in Cincinnati. There are on hand 250 each of third, fourth and fifth years' reports, and the Committee recommend that the reports of the first and second year be reprinted. The report was adopted.

The Committee on Arrangements were called on for report, but presented none.

Messrs. Howard Fry, Grand Trunk; A. B. Underhill, Boston & Albany, and John Thompson, Eastern, Committee on Anti-friction Valves and Valve Gearing, presented report. The report reviews the different kind of valves in use. It was accepted and filed.

On motion of Mr. Flynn, the convention at eleven o'clock adjourned until Thursday morning at nine o'clock.

THIRD DAY.

The Convention was called to order Thursday morning at fifteen minutes past 9 o'clock, by Mr. H. M. Britton, President.

VALVES AND VALVE MOTION.

On motion of Mr. Howard Fry, Grand Trunk Railway, Mr. James Wheelock, of Worcester, Mass., read a paper he had written on valves and valve motion. The paper states that nothing has been introduced that so well answered the purpose of controlling the induction and eduction of steam to the locomotive cylinder as the ordinary flat slide valve, nor does it seem probable that it will ever be superseded. The author gives a description of his invention, which was constructed on the rotary principle. The valve chest is a cast-iron cylindrical casing, provided on the upper side with inlet for steam pipe connections, through which steam passes to an annular chamber surrounding an inner shell, the axis of which, being at right angles with the bore of the steam cylinder, and being bored conically, forms the seat of the valve. In this conical seat is fitted a double-ported double-seated valve or plug of corresponding shape, making the taper about one-half an inch in its entire length. Bonnets or covers are fitted to each end of the casing, which are used to support the plug on hardened steel bearings, on which it was supposed the bearings would principally come. Steam being admitted to the cylinder through each end of the plug, as it is alternately moved by a stem projecting outside, on to which is keyed a crank, which receives motion from the valve rod. In order to control the position of the plug and make adjustment easy, a nut and check nut were placed on the valve-stem, arranged to bear against the outside surface of the bonnet, and when the engine was using steam a slight end pressure brought the nuts up to a ground seat and obviated the use of a stuffing-box or packing. The exhaust was effected by cavities on the periphery of the plug, very much in the usual way, there being two cavities—one on each side—connected. An engine was selected and trial made. At first descending grade the engine was stiff, steam rapidly accumulating; the furnace door was opened, and a strong exhaust was discovered drawing hard on the fire, and the fire-box was soon emptied of its fuel, the engine blowing off violently.

The valve was tried a year, when the trial ended. During the year the valves were taken out and looked at. When taken out they had the polish of a mirror. Anti-compression and relief valves were put in and changed this way and that way. Every day some new thing was suggested to make the engine better. A second valve was applied, with some of the details changed, and the verdict was, "the engine did not do as well as with her old style of valve." He deduced from his experiments that every addition of a single piece to the locomotive valve or its attendant parts that is not positively required to make the engine work better is a positive step backward, as considerable pressure exists on the exhaust sides and is made necessary for blast while the engine is moving at ordinary speed, makes any further balancing of valves practically unnecessary; that it is far from beneficial to draw in cold air through anti-compression or any other valves; that it is important to arrange valves so as to allow free circulation from one side of the piston to the other, when the engine is in rapid motion with steam shut off, which is attained by allowing the ordinary flat slide valve to raise from its seat.

The paper recommends that the valves should work light, and be refaced. Locomotive cylinders should be constructed of the best charcoal iron, and valve seats should be cast on a chill, and the exhaust tip should be contracted. The paper concludes with attributing the deficiency in locomotive power to the "link motion."

The paper was listened to with the most profound interest

and attention, and at the conclusion the author was greeted with applause. The paper was ordered to be placed on file.

MACHINERY FOR REMOVING SNOW.

Messrs. J. W. Philbrick, Maine Central; J. U. Foss, Vermont Central, and E. Studley, late of Concord, Committee on the Machinery for Removing Snow from the Track, presented report. The variable conditions of the obstacle which it is proposed to remove are first considered. While in some places snow rarely exceeds a foot in depth, in others it lies on the ground continuously for four or five months, with high winds and a temperature often of many degrees below zero for several days in succession, the wind often piling the snow in drifts of ten feet and upward, and with the cold compacting them into solid masses. Or again, when the amount of snow is not great, but when high winds prevail, bringing along with the snow large quantities of sand or soil, the excavations were filled with a mixture very hard to break. In considering the means for removal, the Committee state that no device has appeared, or is likely to appear, which can be successfully substituted for the plow. Other inventions have been made, models of two of which were sent to the Committee. One is constructed with a broad shovel-edge in front, and a flue running up and back, through which a belt, with flat scoops attached, is made to revolve, by which it is proposed to take up the snow, carry it up the flue, and by a revolving disk behind to throw it off on either side. The other, "Griswold's Air Snow Plow," is designed, by means of a current of air produced by blowers, to drive the snow taken up from the front through a curved pipe and discharge it on either side of the track. The Committee do not, however, think that they can supersede the plow, which is to be attached to the pilot, or a modification of the pilot, followed if necessary by a flange-scraper. The Committee consider the different conditions of snow to be encountered, and recommend various modes of operation. They state that if snow would lie still and be uniform in depth there would be comparatively little trouble. They therefore recommend protection of the track at exposed points by planting of trees and erection of sheds.

The various styles of plows that may be used are:

First. Separate structures resting on truck frames placed within their sides.

Second. Plows attached to heavy cars within which men may be carried to operate them.

Third. Plows attached to engines.

The merits of the various plows of the three kinds are discussed, and the subject illustrated by drawings and photographs.

FORMS AND PROPORTIONS OF AXLES.

Messrs. M. N. Forney, Railroad Gazette; Coleman Sellers, Philadelphia, and Gordon H. Nott, Boston, Committee on "The Best Form and Proportion of Axles for Cars and Locomotives, also Whether there is Anything to be Gained by the Use of Compound Axles and Loose Wheels," presented their report. The report states that the Committee collected information on the following points: The dimensions of the standard car axles now used; at which point they break; what proportion of breakages occur close to the hub of the wheel on the inside, and relative proportion of breakages at other points; the diameter at the wheel seat and center of the axle; dimensions of driving and truck axles to approved locomotives, when fractures of such axles occur; the rule of forcing on car and locomotive wheels; the use of compound axles, or axles upon which the wheels are loose, or each turn independently one of the other; the difference between the resistance of a car or truck with loose, and one with tight wheels, in passing around curves of any given radius; the opinion of master mechanics regarding compound axles or loose wheels.

Thirty-one replies were received, the result of which is contained in tables submitted. The Committee recommend some action to establish a standard size of axles for universal use. The report states that the result of replies shows that a large majority of fractures occur just inside the hub of the wheel, as to dimensions of which the Committee deem it necessary to make further inquiries, yet feel satisfied that an increase of length over 5½ will be found to be in the direction of economy. To the inquiry regarding the breaking of locomotive axles, the replies were that the breakages occur almost invariably next to the hub of the wheel. With reference to the forcing on of car and locomotive wheels, the Committee recommend the plan of A. Whitney & Sons. The replies to questions relative to loose wheels brought forth the fact that none have had experience with such wheels, and nearly all are very decided in their condemnation of all loose wheels and compound axles.

The Committee presented a paper from Mr. Wells, of the Jeffersonville, Madison & Indianapolis Railroad, containing an account of experiments which he made to illustrate the effect of loose and tight wheels on curves, which, at the request of the Committee, Mr. Wells partly read, and the paper was ordered to be printed with the report.

The Committee then proposed a resolution that they be continued and authorized to confer with the committee appointed by the Master Car Builders' Association for the same purpose, and report at the next meeting, which was adopted. Also a resolution that in the opinion of this Association no practical advantages will result from the use of loose wheels or compound axles of ordinary railroad service, which was adopted.

REMOVING WRECKES AND ERECTING BRIDGES.

Messrs. Morris Sellers, of Pittsburgh; D. O. Shaver, of Pennsylvania R.R., and S. Moore, of Pittsburgh, Fort Wayne & Chicago Railway, Committee on Machinery and Appliances for Removing Wrecks and Erecting Bridges, submitted a report which states that they have issued circulars, receiving replies from twelve roads. The report, which is a brief one, sums up as follows: "Your Committee, from experience as well as from the information before them, can only recommend a good assortment of strong lines, good blocks, jacks and hand tools kept in a tool car, conveniently arranged for storing the tools, and ready for immediate use. When needed they are to be handled with promptness and judgment."

Accompanying the report was a letter from Mr. R. Wells, of the Jeffersonville, Madison & Indianapolis Railroad, describing an apparatus used by him in pulling cars on the track when they may be off on one side, or for straightening the truck toward the point to which it is desired to pull the car. It consists of a bar of iron about 2 by 4 inches, bent like the ball of a bucket, with a hook or turn on each end of it large enough to hook over an axle close to each wheel. The report and letter were placed on file.

At twenty minutes of eleven o'clock the convention took a recess of ten minutes.

On reassembling, the President announced that carriages would leave the Carrollton Hotel at 2:45 for the Camden street depot, for the excursion to Mount Clare, and that carriages would leave the same place this morning at 7:45 for same depot for excursion to Washington. On motion of Mr. Wells, it was resolved to leave Washington on return to Baltimore Friday afternoon at five o'clock.

TEST OF BOILERS.

The President introduced to the convention General D. D. Smith, Supervising Inspector-General of Steam Vessels of the United States. He said he had come from Washington to listen to the deliberations of the convention, and not to make a speech. He would inform the convention, as a matter of importance to them, that Congress had appropriated \$100,000 for the purpose of experimenting to discover the cause of boiler explosions. Experiments would probably be made during the months of September, October and November next, at Pittsburgh

or Cincinnati, and at Sandy Hook, N. J. The effort would be made to find the cause of explosions, and in this master mechanics who navigate the land were interested as much as those who navigate the sea. On their visit to Washington he would be pleased to see any or all of the delegates at Room 23, Treasury Department. [Applause.]

On motion of Mr. Wells, it was resolved to appoint two committees, of five each, to attend the experiments.

STEEL TIRES.

Messrs. J. N. Lander, Concord & Claremont; F. A. Waite, Boston & Maine, and George H. Griggs, Worcester & Nashua, Committee on Steel Tire, reported that they addressed circulars to various roads, receiving replies from twenty. The information they obtained they have arranged in tabular form. The merits of various makes of steel tires are considered, and various statistics in regard to their wear presented. The removal of tires, their setting and fastening, chilled tires and steel wheel and axles are also discussed, and various facts in regard to them presented. The report was accepted and discussed at some length.

MECHANICAL LABORATORY.

Mr. Robinson, from Committee on Mechanical Laboratory, reported a resolution that two more be added to the Committee, consisting of the President and First Vice-President of the Association, *ex officio*; and also, to render the ensuing year useful for the purposes of the Committee, a sum not exceeding \$500 be voted from the Boston donation, to be expended in the purchase of a dynamometer and other instruments for the use of any member of the Convention, under certain regulations to be drawn up by this Committee, which was adopted.

Mr. Coleman Sellers, from the Committee on Premiums, reported that the Committee would not report until the evening session.

The special committee on Mr. Gardner's invitation to take a trip on the Pennsylvania Railroad, from Harrisburg to Pittsburgh, reported that they had found on inquiry that the members could not avail themselves of it, and would recommend the declination of the invitation with thanks. Adopted.

The special committee on place of meeting next year reported having selected Rocky Point, R. I.; Richmond, Va.; New York city, and Cincinnati, Ohio, from which the Convention is to make a selection.

Mr. Eddy moved to add the name of Chicago, which was done, and the report was accepted.

The Convention proceeded to the election of officers for the ensuing year. Messrs. J. H. Flynn, Western & Atlantic Railroad, and Thomas Kerr, United New Jersey roads, were appointed tellers.

Election of President was first in order. Mr. Elliott nominated Mr. H. M. Britton, of Cincinnati, President since 1868, for re-election. He was unanimously elected, and returned his thanks for the honor done him.

Mr. N. E. Chapman, of Cleveland, Ohio, was unanimously re-elected First Vice-President. Mr. Chapman returned his thanks.

Mr. Little moved, before proceeding to a vote for Second Vice-President, that a letter of the late Second Vice-President be read, which was adopted.

The Secretary stated that the letter was a private one, and the motion to have it read was reconsidered.

For Second Vice-President, Mr. Durgin nominated Mr. Wilson Eddy, Boston & Albany Railroad, Springfield, Mass. Mr. Wells nominated Mr. W. A. Robinson, Great Western Railroad, Hamilton, Ont. Mr. J. H. Flynn, Western & Atlantic Railroad, Atlanta, Ga., was nominated, but declined.

The vote stood: For Mr. Robinson, 24; for Mr. Eddy, 20; for Mr. Flynn, 6; for Mr. J. M. Boon, Fort Wayne, Ind., 1.

There being no choice, another ballot was ordered. Messrs. Eddy and Flynn positively declined. The second ballot stood: For Robinson, 49; Flynn, 18; Eddy, 7; Kerr, 2, and Philbrick, 1. Mr. Robinson returned his thanks.

Mr. J. H. Setchel was unanimously re-elected Secretary, and Mr. S. J. Hayes, of Chicago, was unanimously re-elected Treasurer.

Messrs. C. Sellers, Losey and Peeples were appointed a committee to prepare resolutions for the convention.

A resolution was adopted instructing the General Supervisory Committee to act as trustees for the Boston fund.

About 2 o'clock the convention adjourned until 8 p. m.

EVENING SESSION.

The convention reassembled at 8 o'clock p. m.

PREMIUMS FOR DRAWINGS.

Messrs. M. N. Forney, Railroad Gazette; W. S. Hudson, Rogers Locomotive Works, and Coleman Sellers, of Philadelphia, Committee on Premiums, submitted a report, stating that they had awarded the first premium of \$75 to Mr. E. Moyer, of the Kansas Pacific Railway, for drawing of design of apparatus for supplying locomotives with water, and the second premium of \$50 to Mr. Frank B. Philbrick, of Waterville, Maine, for drawing of design of apparatus for removing snow.

The report was adopted.

PLACE OF NEXT MEETING.

The report of the Committee to select a place for the next annual meeting was read.

Mr. Gorman moved St. Louis be added to the list, which was lost.

A motion was adopted to proceed to ballot for a place, and that after the first ballot all but the two highest be dropped.

The ballot resulted as follows: Chicago 50, New York 11, Cincinnati 7, New Orleans 3, St. Louis 1, and Richmond 1. The vote was made unanimous.

COMMITTEES ON BOILER TESTS.

The Chair appointed the following committees to attend the experiments to be made by the Government in regard to boiler explosions:

For the West—R. Wells, J. R. Peddle, J. H. Setchel, S. M. Cummings and N. E. Chapman.

For the East—A. B. Underhill, H. L. Brown, J. H. Flynn, Thos. Kerr and W. A. Robinson.

On motion the name of the President was added to both committees.

INSTRUMENT FOR TESTING SLIDE VALVES.

Mr. M. N. Forney read a paper that he had prepared on the subject of a proposed instrument for testing the motion of slide valves. Lithographic copies of the designs were distributed through the convention.

POWER OF THE ASSOCIATION.

Mr. F. B. Miles, of Ferris & Miles, Philadelphia, Pa., read a paper entitled "Our Power and Responsibility as an Association with regard to the quality of Material, Workmanship and Design used in Railroad Service," which was frequently applauded.

SUBJECTS FOR NEXT MEETING.

Mr. Fry, from the Committee on Subjects, reported the following for the consideration of the Association at its next annual meeting:

Narrow gages—The actual weights of different classes of rolling stock, the gross tons the engines actually running and of given weights can haul, and the actual loads that freight cars carry.

Fuel—Actual consumption per ton per mile of different kinds of fuel.

Indicator diagrams—Standard axles—Apparatus for supplying water to tanks of water stations, description of engine, windmills, &c., and cost of working the same.

Train resistance—Methods of testing pressure gauges and best methods of relieving boilers of overpressure.

Utility of feed-water heaters—Tires—The thickness of tires when put on, the thickness when taken out, cause of taking out, diameter of wheel, weight on each wheel, number of times tire has been turned, total miles tires have been run, maker's name.

Valves and valve gearing—Lubricants used for machinery and cylinders of locomotives, miles run to quart of oil.

The following subjects were continued: "The operation and management of locomotive boilers, including the purification of water, and the comparative value of anthracite coal, bituminous coal and wood for generating steam in locomotives."

Mr. Street moved that the subject of continuous train brakes be added to the list. Adopted.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

The Committee on Resolutions reported as follows:

"Your Committee report that upon inquiry into the circumstances attending the hospitality that has been extended to the members of this Association by the citizens of Baltimore, they find the noteworthy fact that the contributors to the fund are citizens who have no pecuniary interest in the matters over which members of this Association have control, but have been influenced by the kindest feelings toward those who have charge of the machinery of the railroads that contribute to the general wealth of the nation. It has been freely given, with the knowledge that this meeting in their beautiful city is to increase their usefulness by interchange of thought and mutual improvement. Your Committee, in the resolutions herewith submitted and offered for your approval, desire to call attention to the hospitality which has so generously been extended, not only to the members of the Association, but, in such an admirable manner, to the ladies who have accompanied the members from their various homes in all quarters of the land, to note the flattering attention of the press of the city of Baltimore to our proceedings and who have evinced a greater interest in our objects than we have noted in any city where we have previously visited. The visit to Annapolis by boat, with all its pleasurable associations, the delightful ride to the park, are fresh in the memory of those who participated in them. To express these thoughts in fitting terms your Committee respectfully submit the following preamble and resolutions:

"Whereas, In these annual meetings of this Association there is, by the interchange of ideas, a great good accomplished; and

"Whereas, The meetings apart from their utility to the country, are a means of encouraging pleasant relations among those whose interests are in common; and

"Whereas, We can see the advantages to be gained from these social reunions in the places visited; therefore

"Resolved, That the sincere thanks of this convention be returned to the citizens of Baltimore, through Mr. G. H. Hunt and his associates of the Executive Committee, and to Mr. Wm. Reed and his associates of the Reception Committee, for their courteous hospitality.

"Resolved, That we tender our sincere thanks to the officers of the various railroads who have kindly extended favors to the Association, among whom are the Baltimore & Potomac, Northern Central, Philadelphia, Wilmington & Baltimore, Baltimore & Ohio and Pennsylvania Central railroads, and to many others who have favored us in coming to this convention and in returning to our homes.

"Resolved, That the thanks of this Association be eminently due, and are hereby sincerely tendered, to the press of Baltimore for the very flattering attentions paid us by the full reports of our proceedings.

"Resolved, That we remember with pleasure the many kind attentions paid to the ladies accompanying the members of the Association by the committee in charge, and tender to them in their behalf our sincere thanks.

"All of which is respectfully submitted.

"COLEMAN SELLERS,
"FRED. C. LOSEY,
"THOS. W. PEEPLES," Committee."

MISCELLANEOUS.

Mr. N. E. Chapman, from Committee on Standard Size of Nuts, presented a report. Would recommend adoption of sizes adopted by the Association of Manufacturers of Bolts and Nuts. Report was accepted.

The appointment of committees on subjects was deferred to suit the convenience of the President.

Mr. Wells moved the same General Supervisory Committee as served last year be continued, which was adopted.

The following is a list of new members, in addition to the list published in the report of the first day's session.

F. Gould, Missouri, Kansas & Texas; L. O. Gassett, Lake Shore & Michigan Southern; Martin Wells, Philadelphia & Erie, Sunbury, Pa.; Samuel St. Ingber, Jeffersonville, Madison & Indianapolis, North Madison, Ind., and R. V. Dohoney, late of Western Maryland Railroad, Westminster, Md. Making twenty-six new active members who have joined during the session.

Seventy dollars were received from delinquent members during the session.

Mr. Flynn offered a resolution that the President, Vice-President and Secretary be a committee to request all presidents and superintendents of roads not represented to send their master mechanics to the next convention.

Mr. Mills offered to amend the constitution so that any member delinquent in his dues for two years his name shall be stricken from the rolls. Adopted.

The compensation of the Secretary was fixed at \$500 for the ensuing year.

Mr. Coleman Sellers offered a vote of thanks to the President, Secretary and other officers for the efficient manner in which they discharged their duties. Adopted with enthusiasm.

The President returned his thanks to the members for their kindness and attention to business, and at 20 minutes of 11 o'clock the convention adjourned *sine die*.

The President announced that the next meeting of the convention would be held in Chicago, on the second Tuesday in May next.

VISIT TO MOUNT CLARE.

The interim between the morning and evening session was passed by the delegates and a number of their ladies in a visit to the Mount Clare Works, on the invitation of the Baltimore & Ohio Railroad. Carriages left the Carrollton Hotel and conveyed the guests to the Camden street depot, where a special train of new and handsome cars were in waiting. The train arrived at Mount Clare at 4:10 o'clock, and the master mechanics went through the shops, and took a deep interest in the different operations going on. They first examined the piecing of wrought-iron flues by welding, then the steam hammers of the blacksmith shops, especially a huge trip hammer, cutting an immense pedestal for engine frames; then the engine room, then the process of welding an axle was examined; next heading bolts, the making of car wheels, the pattern house, the bridge shop, and the testing of the strength of the work by hydraulic pressure; the planing mill, where the lumber is prepared for car building, and where the car may be said to commence; then the passenger car shop, where the frames are put up. Here five new postal cars are in process of erection, also two new baggage cars and six regular passenger cars; the paint shop and upholstery department, where the car is finished; the locomotive shop, where eight engines are under way, and an order has been commenced for twenty-five freight engines. About four engines a month are turned out at Mount Clare.

The boiler shops were next visited. The Loughridge brake, which has been in use on the Baltimore & Ohio Railroad for one year, and the process of putting the steel tires on wheels attracted much attention. The ancient grasshopper engines were shown, and many took a short ride on these relics of the past.

During the stay at Mount Clare the visitors were cared for and shown everything of interest by the Executive and other committees, by William Keyser, Second Vice-President of the Baltimore & Ohio Railroad; J. L. Wilson, Master of the road; Wm. Woodside, Paymaster; Edward Potts, Secretary to John W. Garrett, the President of the Baltimore & Ohio Railroad; John C. Davis, Master of Machinery; Messrs. W. A. Shipley, Samuel Houston, Jacob S. Shryock and other gentlemen connected with that road. The scene at Mount Clare was a busy one, some 3,500 men being employed. It requires \$130,000 per month to pay them off. The pay roll of the Baltimore & Ohio Railroad for April amounted to the large sum of \$769,000, and this amount is exclusive of the expense of the ticket department. At 6 o'clock the train returned to Camden Station.

VISIT TO WASHINGTON.

On Friday, the members of the Association paid a visit to Washington, at the invitation of the Baltimore & Ohio Railroad Company, and in a special train furnished by the company. The visitors left Baltimore at 8:30 a. m., and arriving in Washington visited all the public buildings and places of interest, and started on the return to Baltimore at 5 p. m., reaching the city after a run of 55 minutes. A voluntary contribution of \$65.50 was made by the passengers, to be divided between the engineman and fireman. The train was equipped throughout with the Loughridge air-brake, which has been adopted by the Baltimore & Ohio Railroad, after full tests and experiments in comparison with other air-brakes.

After returning to Baltimore the Association was serenaded at the Carrollton Hotel by the military band from Fort Mcherry.

VISIT TO NEW YORK.

A very large number of members and their friends accepted the invitation to visit New York given by the manufacturers and dealers in railroad supplies of that city, who had, very many of them, contributed munificently toward their entertainment. A special train of six cars was tendered by the Pennsylvania Railroad Company, to which the Pullman Palace Car Company added three of its elegant parlor cars. This train left Baltimore at 8 a. m. On arriving in New York the guests were escorted to the St. Nicholas Hotel, whence they were taken in carriages to and through Central Park and other objects of interest in the city.

In the evening at 8 p. m. a magnificent dinner was given at the St. Nicholas Hotel, at which nearly 200 seats were occupied. At this John C. Wyman presided, assisted by L. G. Tiltson, of L. G. Tiltson & Co., and Col. Richard Vose, of Vose, Dinsmore & Co. After the cloth was removed, Mr. Wyman made an address in which he spoke of the great changes brought about by the railroads in this country. There was a time when a man who undertook the journey from New York to Boston was the subject of the earnest prayers of his pastor. Now, the railroad men have brought New York and Boston nearer together, in point of time, than New York and Boston were a few years ago. The railroads are making the whole nation homogeneous. Business can, through their means, be accomplished with certainty and dispatch; the life, the prosperity, the safety even of the country were dependent upon the railroads. For all these advantages in their perfectness we are indebted to the master mechanics. He gave the toast, "The Railway Master Mechanics' Association."

H. M. Britton, President of the Association, was called upon to respond. He thanked the merchants of New York for the kindness and hospitality shown in their reception, and spoke of the pleasure it gave him to meet those who were interested in their work. Z. K. Pangborn was then called upon by the Chairman as one knowing something about railroads and willing to impart some of his knowledge. "The Iron and Steel Interest" was the subject of the next toast, and to this A. L. Holey responded. Capitalists, he said, were usually too impatient for a quick return upon their investments; unwilling to wait until time had developed the business. The iron and steel manufacture had increased in this country to such an extent that they were now able to cope with England in supplying the world. "The Objects of Railway Conventions and how they are to be attained" was the text upon which Col. Richard Vose made a few remarks. Speeches were made by H. G. Brooks, of the Brooks Locomotive Works, and others.

The following is a list of the contributors to the New York reception:

Ramapo Wheel Works (W. W. Snow), Loco-Engine Safety Truck Co. (M. F. Moore), S. T. Baker & Co. (N. O. Parks), Post & Kalkman, Standard Steel Works (Wm. Tothoe), Aaron French & Co., D. A. Stevens & Co., Taylor Iron Works (E. L. Brown), Moore Car Wheel Co. (H. W. Moore), Nathan & Dreyfus, Vose, Dinsmore & Co., Schenectady Locomotive Works, Brooks Locomotive Works, Grant Locomotive Works, Danforth Locomotive & Machine Works, Rogers Locomotive & Machine Works, Hussey, Wells & Co. (C. Roby), L. G. Tiltson & Co., N. & A. Middleton, Thos. Prosser & Son, John R. Thompson, Chrome Steel Works (C. P. Haughen), W. Gregory & Co., B. Atha & Co., N. Y. Steam Engine Co., Geo. F. Blake & Co. (J. H. Harris), Wm. C. Allison & Sons, Valentine & Co., Chas. Congreve & Son, Walton Brothers, New England Car Spring Co., Union Car Spring Manufacturing Co., McNairy, Claflin & Co., Baker, Smith & Co., E. Miller, Wm. G. Ulery, Manhattan Oil Co., Goddard & French, Murphy & Co., H. A. Rogers & Co., Buffalo Steam Gauge Co., N. Y. Belting & Packing Co. (J. H. Cheever), Vibbard, Foote & Co., Knowles Steam Pump Works, John Cramer (Cramer, Adams & Co.); Providence Tool Co., Lewis Oliver & Phillips, Reading Bolt & Nut Works, Wm. H. Haskell & Co. (H. R. Newhall, Agent); R. Dodgeon & Co. (J. D. Dettman), Morris Tasker & Co. (R. Pancoast), Hendricks Bros., John C. Wyman, Vacuum Brake Co., Sligo Iron Works (E. H. Gardner), G. W. Richardson & Co., New Haven Copper Co. (Holmes & Lissberger).

The following were the committees upon whom the work of designing and carrying out the entertainment chiefly devolved:

Executive Committee.—N. O. Parks, Colonel C. W. Kalkman, M. F. Moore, C. Roby, R. R. Wood, General E. S. Greeley. Wm. Tothoe, Chairman and Treasurer.

This committee was appointed March 26, and the following April 18:

General Committee.—N. O. Parks, Chairman, Wm. Tothoe, Colonel C. W. Kalkman, R. R. Wood, M. F. Moore, C. Roby, General E. S. Greeley.

Committee on Invitations and Printing.—Max Nathan, Chairman, Wm. Tothoe, Colonel C. W. Kalkman, N. O. Parks.

Commissary Committee.—C. Roby, Chairman, R. R. Wood, M. F. Moore, C. Palmer, E. H. Lynde.

Train Reception Committee.—Wm. G. Ulery, Chairman, Gen. E. S. Greeley, Max Nathan, C. Doyle, C. P. Haughen, H. W. Moore, W. W. Snow, F. C. Rogers.

Train Committee en Route.—F. Murphy, Chairman, W. B. Post, Aaron French, J. H. Harris, E. L. Brown, Col. E. Miller, Captain Parker, A. Middleton.

Baltimore Committee.—Colonel C. W. Kalkman, Chairman, F. W. Cummings.

Banquet Reception Committee.—H. G. Brooks, Chairman, C. Roby, P. W. Millepaugh, W. G. Ulery, S. T. Baker, W. S. Hudson, C. E. Bigelow, R. R. Wood, H. C. Valentine, Geo. Place, Max Nathan, D. B. Grant, Benjamin Atha, J. W. Allison, H. A. Rogers, James Cooke, James R. Thompson, Benj. Gregory, John C. Eliis, Richard Pancoast.

Press and Sentiment Committee.—W. C. Baker, Chairman, Colonel Richard Vose, L. G. Tiltson, John C. Wyman, George Place, Colonel R. E. Ricker.

Committee on Park and Carriages.—N. O. Parks, Chairman, F. C. Rogers, John French, W. B. Wilkins.